MODERN DAHLIA CULTURE

W. H. WAITE

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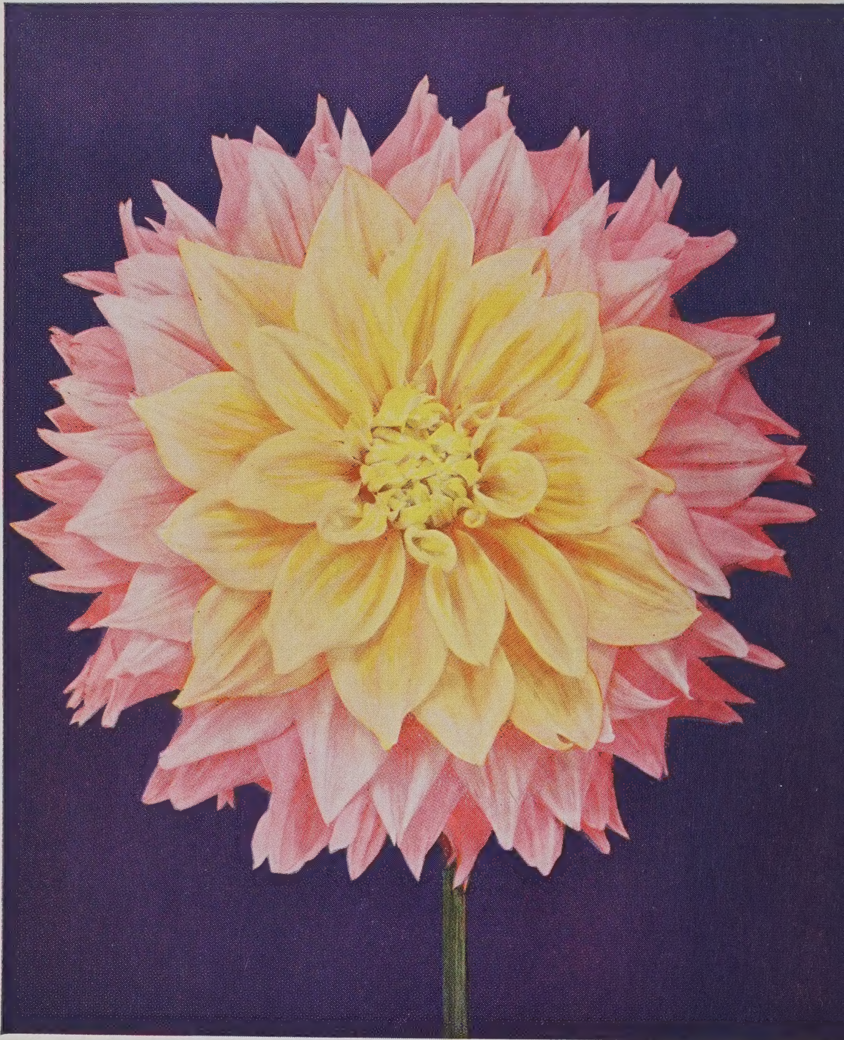

KATHERINE COLE

A splendid keeping variety and a free bloomer, in color, a beautiful combination of light pink and cream. The stems are long and stiff, yet not thick, and the flower is always looking you in the eye.

MODERN DAHLIA
CULTURE

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MODERN DAHLIA CULTURE

By
W. H. WAITE
ORIGINATOR OF JERSEY'S BEAUTY,
FRANCIS LOBDELL, AND OTHERS

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DEDICATION

To My Past Employer

EDWARD DEAN ADAMS

who, through his generosity and encouragement, has allowed me to devote much of my time to the production of finer and better Dahlias, this little volume is respectfully dedicated.

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PREFACE TO FIRST EDITION

I HAVE long been an enthusiastic grower of the Dahlia, and my only excuse, in offering this brain child to the long-suffering patrons of horticulture is that in my everyday practice and my work devoted exclusively to horticulture, I have acquired a certain amount of practical knowledge that I am glad to pass along.

That there are many Dahlia fans (to use a colloquial term) who are seeking information on how to grow better Dahlias, is borne out by the amount of correspondence I receive; and by the number of questions I am asked by visitors to our gardens.

In these few chapters I have tried to answer these questions at greater length. I make no pretence to being literary; I am more at home in the garden than at the writer's desk.

I have tried to go into detail in discussing the propagation, culture and management of the Dahlia, for it is only by attending rigorously to details that success may be assured.

I wish to acknowledge my indebtedness to Johnston's "Agricultural Chemistry," and Fream's "Elements of Agriculture" for much of the information upon which the material dealing with the chemistry of the soil is based.

If this, my maiden attempt, should prove the means of helping my fellow enthusiasts to grow BETTER DAHLIAS, I shall be amply repaid.

W. H. WAITE.

January, 1925.

PREFACE TO SECOND EDITION

It is most gratifying to know that my book has met with such a demand as to make a second edition necessary.

The number of complimentary letters received since this book was published gives evidence that it fills a long felt want, especially now that the raising of the better class of seedlings is in vogue. Many have written asking for information on "hand fertilization," and I have written new subject matter to cover this.

During the past two years I have given more study to the diseases that affect the Dahlia, especially the stunted condition, which is the most annoying of all, and have here given the results of this study. I trust that this new edition will continue to aid all those who would like to know and grow the Modern Dahlia.

W. H. WAITE.

March, 1928.

PREFACE TO THIRD EDITION

That a third edition of this book has become necessary pleases me very much, for it is a sure indication that such a book was needed. I am continually receiving letters from people who say that since reading the book and following its instructions, they are growing better and finer Dahlias. Only recently I received a letter from a gentleman in Georgia who says that he bought the book and before reading it, he did not know a thing about the Dahlia, but after perusing its pages and following the instructions given therein, he grew such wonderful flowers that he was able to take some first prizes at his local flower show. Since the first two editions were published, I have changed my address from Rumson to Eatontown, New Jersey, and all letters should be addressed to me there. I shall be only too glad at any time to answer questions and aid any one in his or her difficulties pertaining to the culture of the Dahlia.

W. H. Waite.

Eatontown, N. J., April, 1931.

INTRODUCTION

THE Dahlia, largely because of its easy culture and numerous methods of vegetative propagation, its wealth of color, and its diversified form, is one of the most popular garden plants we have today.

It has been known to horticulture for upwards of 150 years, seeds of it having been sent from Mexico in 1789 to Abbe Cavanilles of the Royal Gardens at Madrid. I wonder what he would say if he could see some of our modern Dahlias?

It was not until 1814 that any record was made of double flowers, the originals having been singles and not much different from Cosmos bipinnatus. It thus evidently took some twenty years for the first break towards the double form to appear. In 1814 there were listed some twelve distinct varieties. And, according to records, twelve years later the list had only increased to sixty.

It was not until 1864, when the original and first Cactus type (*Dahlia juarezi*) was introduced, that a real impetus was given to the production of new varieties.

According to reliable authorities, Dahlias as we have them today have all descended from Dahlia variabilis and D. juarezi.

In 1826 there were sixty varieties cultivated by the Royal Horticultural Society of England. This past year a book has been compiled by Professor Norton containing 8000 names of recognized varieties that have all been catalogued at one time or other!

In the past decade the Dahlia has been improved to a remarkable degree. The plants now have a longer blooming period; they are sturdier and better in habit; and we are now getting all types with firm stems.

The following quotation from *House and Garden* has always appealed to me, and is worth repeating here:

> "The Dahlia is the busy man's flower—robust, reliable, repaying a small amount of care with a wealth of bloom at a season when the rest of the garden too often is at tag-ends.
>
> "A flower, too, for one who likes to build up a stock of his or her raising, for the increase each year is fourfold or more. No sunny spot of ground that is reasonably well drained need be without its Dahlias, for they are immensely adaptable. Any lack of soil fertility can be made up by artificial means."

MODERN DAHLIA CULTURE

SITUATION AND SOIL TYPES

THE Dahlia delights in an open, sunny situation. It is true that the flowers of some varieties, if given partial shade, especially during the heat of the day, will retain their color for a longer period. Pink and red varieties will invariably have a better color if shaded a little during very hot weather.

They should never, however, be planted under, or very near, large trees. Close to the trees there would be too much shade and the roots of the trees would keep the ground impoverished and too dry for their successful growth.

An ideal place would be one with an open situation to the morning sun, shade at noontime, and full sunshine from three o'clock in the afternoon until sunset.

A free circulation of air should be aimed at as Dahlias at all times require plenty of fresh air.

Soil Types and Terms

Dahlias may be successfully grown in various soils, but a good, rich garden loam, rich in humus, is the best. What, then, is loam?

Nearly all soils of the garden will be found to contain sand, clay, a little lime and some amount of humus. Inasmuch as clay and sand are, in point of quantity, the leading ingredients of most soils, it has been found convenient to classify soils according to the percentage of clay and sand that they contain.

Suppose that a soil consists almost entirely of sand and clay, but that the quantity of clay does not exceed 10 per cent of the weight; a *sandy soil* is the result. If there is from 10 to 40 per cent of clay, it is termed a *sandy loam.*

If it contains from 40 to 70 per cent of clay, it is a *loamy soil;* if from 70 to 85 per cent of clay, it is a *clayey loam;* and if from 85 to 95 per cent of clay, it is a *strong clay.*

We therefore see that a loam is a soil consisting of a mixture of sand and clay, in which neither ingredient is greatly in excess of the other.

A *gravelly loam* and a *chalk loam* are those in which gravel and chalk, respectively, are noteworthy ingredients.

A *marl* is a clayey soil containing from 5 to 20 per cent of carbonate of lime; should the latter exceed 20 per cent of the total weight, a *calcareous soil* is the result.

For nearly all purposes, and especially for the Dahlia, loams make the most suitable soils. If a soil happens to be excessively sandy, clayey, calcareous, or peaty, it will be improved in character in proportion as it is brought to resemble a good medium loam. The object of the cultivator, then, should be as far as possible to bring it into such a condition.

Experience has proven that a soil is best adapted for purposes of cultivation, when it contains the following:

Sand (silicous and calcareous)	from 50 to 75 per cent
Clay	from 20 to 30 per cent
Pulverized limestone	from 5 to 10 per cent
Humus	from 5 to 10 per cent

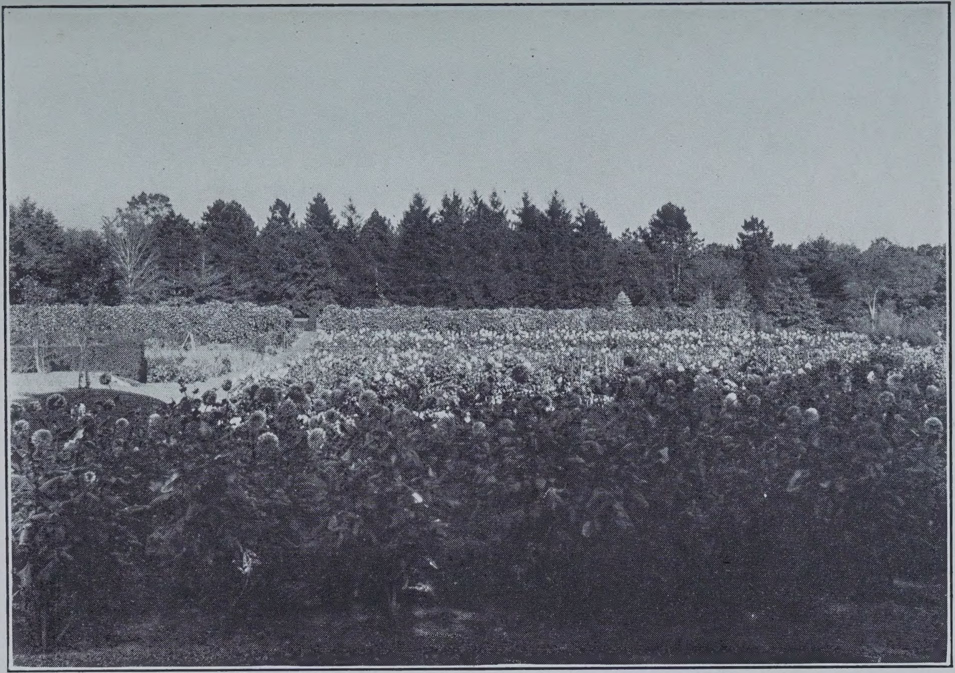
It then contains enough sand to make it warm and pervious to air and moisture; enough clay to render it moist, tenacious, and conservative of manures; enough lime to furnish calcareous material and to decompose organic matter; and sufficient humus to assist in supplying the food requirements of plants and to aid in maintaining the supply of carbonic acid in the interstitial air spaces of the soil.

Such a soil as that indicated in the above table is, however, the exception rather than the rule in nature, most soils being characterized by an excess of one or more of the ingredients.

Various commonplace terms used by gardeners, are applied to soils. For example, a sandy soil is described as "light;" sandy and loamy soils are spoken of as "open" and "free working;" a clayey soil is described as "heavy," because it is sticky and tenacious, or it may be termed "stiff" and "stubborn." As a matter of fact, however, a cubic foot of sand will weigh more than a cubic foot of clay, the terms "light" and "heavy" referring to consistency rather than to density.

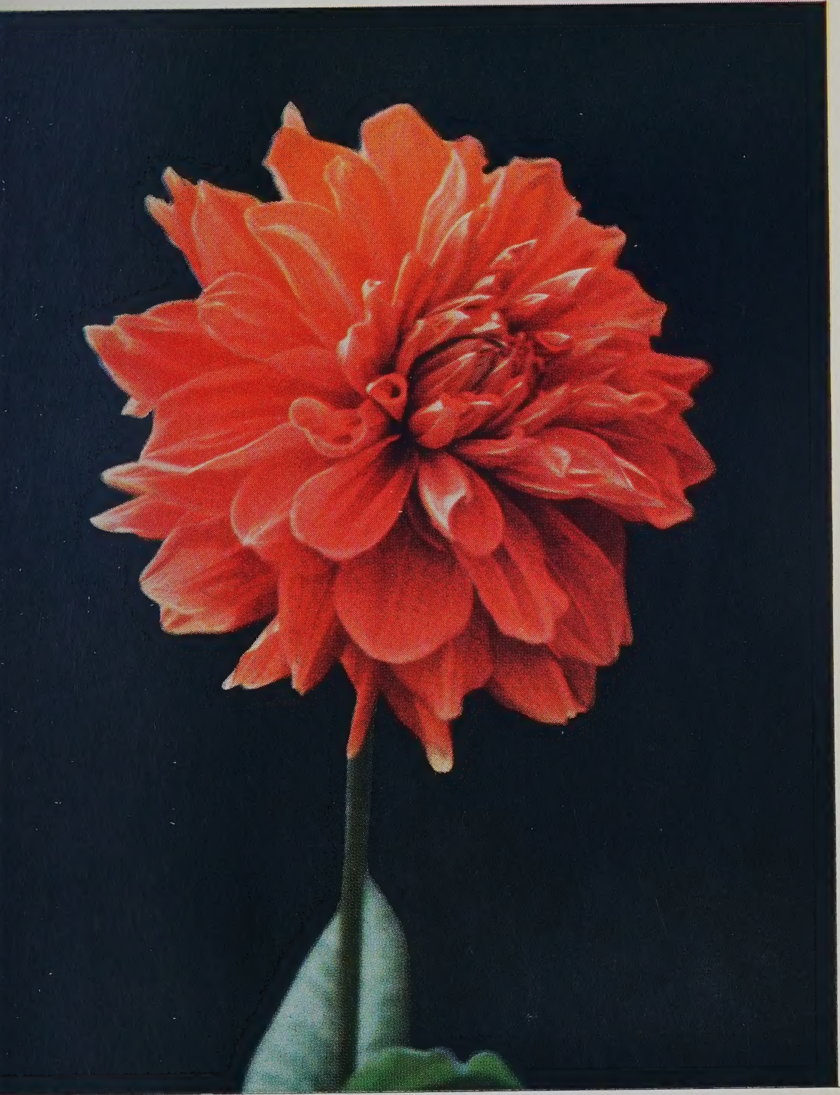
A "mellow" soil is one which by natural or artificial means has been reduced to a fine tilth or state of subdivision.

A "hungry" soil is one which, by nature, is greedy of manure and water, and with but little power of retaining either; a poor, sandy soil is an example.



A WELL-PLANNED, WELL SITUATED DAHLIA GARDEN

The windbreak gives needed protection, but it is not close enough to either shade the plants or compete with them for the soil's supply of food and moisture.



JERSEY'S BEACON

This Dahlia has become a universal favorite. As an exhibition flower it has few equals in its color, but as a garden variety, it is even more spectacular. The color is Chinese scarlet, with a paler reverse, giving it a two-toned effect

A "cold" soil contains an excess of clay or of humus, both of which will retain water.

A "shallow" or "thin" soil is one in which the distance from the surface to the subsoil is but little; some soils are so shallow that they cannot be plowed deeper than 3 inches.

Of the various substances required by all crops to sustain their growth, there are four of which the available supply in the soil is liable to run short so that the deficiency has to be made up by the cultivator. These are nitrogen, phosphoric acid, potash, and lime.

The latter three, as they occur naturally in the soil, belong to the group of mineral ingredients. Nitrogen, on the other hand, is derived from the decay of organic matter, while small quantities are brought down from the air in rain and snow, and also by the culture of leguminous crops which have the power to fix the free nitrogen of the air through the action of certain bacteria in their roots.

Moisture in the Soil

Soils may suffer equally from containing too much water and from having too little.

By draining, on the one hand, and by suitable tillage on the other, it is possible for the cultivator to exercise some control over the amount of moisture in the soil.

Crops, especially in dry weather, draw very largely upon the store of moisture in the soil, this being, of course, due to the rapidity with which water evaporates during daylight from the surface of the leaves.

The water evaporated from the leaves goes off as pure water vapor. The substances that were dissolved in the water when it left the soil and entered the plant roots remain behind in the plant, thus aiding in its nutrition and the building up of its tissues.

Experiments made by chemists have led to the conclusion that from every 250 to 300 pounds of water taken in by the roots and evaporated from the leaves, 1 pound of dry matter is added to the plant.

The maintainance of a suitable degree of moisture in the soil depends largely upon its physical condition, and especially upon its *capillarity.*

Capillary attraction is a physical property known (in action, if not by name) to everyone. When a sheet of blotting paper is held to a drop of ink, the latter rushes into it with a celerity known to every school child. That is the result of capillarity; and it is dependent on the presence in the paper of innumerable very fine tubes.

Myriads of these tubes exist in the soil, and the finer the soil, the more delicate they are, and the more efficient they become. For the smaller the diameter of such a tube, the higher will moisture rise in it through the action of this capillary force.

On the other hand, the coarser the soil—that is, the more inferior their tilth—the wider will be the capillary tubes. If they are too wide, they cease operations altogether.

If the capillary tubes become broken, or too large, then the surface soil is kept from receiving its moisture from the reservoir below.

Thus it will be seen that one of the most important things during the growing season is to keep as fine a tilth as possible, so as to enable the capillary tubes to be always small and active.

Another very important point must be kept in mind: If all the capillary tubes are open to the surface, especially during a period of drought, evaporation can proceed so freely from them, that the underground store of moisture may be insufficient to supply the demand. It is therefore absolutely necessary, by frequent stirring, to keep the surface of the soil in such a state that the capillary tubes are broken a little below the surface. The loose covering of soil acts as a mulch, and arrests the movement of the moisture from beneath. Hence the constant shallow cultivation of the soil during dry weather serves to conserve, rather than to dissipate, the underlying moisture.

PREPARATION OF THE SOIL

IT is of paramount importance that the soil be brought to as high a state of fertility as possible. This is accomplished by several means—manuring, digging or plowing, false or mock trenching, and full or true trenching.

As this is written more with a view to helping the small grower or gardener, I will not go into details of field culture, but will describe the methods used in garden culture.

It may be noted here that trenching should never be resorted to unless the cultivator is absolutely certain that the subsoil (which will in that case be brought up to form the surface soil) is such that it will not be inferior to what is already the topsoil.

Types of Trenching

DIGGING is a process whereby a layer of soil 12 inches or so in depth is turned over. This is very good as far as it goes, but those whose land is so shallow that they cannot secure the proper depth for a good rooting medium must not expect to obtain the same results as those with a soil from 2 to 3 feet deep.

A 12-inch depth of soil, if it be a good, friable loam and properly prepared, will grow some fine plants; that is, if good cultivation and watering are resorted to.

In most soils the harder mechanical work of preparing the soil, such as digging and trenching, should be done in the Fall, leaving the surface of the ground as rough as possible, so that we can have the full assistance of the Winter weather, acting as a pulverizer and disintegrator.

FALSE TRENCHING. By false trenching the cultivator is able to increase the depth of the soil available for the plant roots. The work is done by the following method: Take out a trench the whole width of the plot, about 2 feet wide and 1 foot deep; move this soil to the other side of the plot, where you will eventually finish the work. It will then be used for filling up the last trench.

After the top 12 inches of soil has been removed, a layer of manure should be placed in the trench. Then get into this trench and dig this manure in as deeply as you can with a spade. After this has been done, proceed to dig the second trench, turning the top spit into the first trench. If some manure has been spread on the whole surface, this will get mixed with the soil as it is turned over.

Proceed with the work of turning the soil from one trench into the other until the whole plot has been covered and the soil taken out of the first trench has been used for the finish.

TRUE TRENCHING. In true trenching the work proceeds practically as just described except that the soil to the full depth you want to go is taken out of the first trench and carried to the other side of the plot where the finish will be.

When the first trench is finished, rough manure, rotted leaves, etc., may be placed in it, the bottom having been loosened with a pickaxe. Then the top spit of the second trench is placed in the bottom of the first trench and a layer of manure placed on this; then the bottom spit of the second trench is placed on top of the manure in the first trench, thus becoming the topsoil. Proceed in this manner from trench to trench until the whole plot is done, then what came out of the first trench is used to fill the last trench.

Trenching should only be done in order to make a deeper and more fertile soil. It should *not* be done if a gravelly or sandy subsoil will be brought to the surface—or, in fact, any kind of soil that is going to be inferior to what was previously already the topsoil.

To break up a hard pan (which is a solid subsoil and impervious to water) it is better to false trench for a few years before true trenching is done.

In some soils it will be found feasible only to loosen up the lower strata with a pickaxe; if this practice is followed for a few years, the depth of friable loam will steadily increase, until the maximum depth is reached. When this is attained, the grower may resort to true trenching, for the lower strata will then have reached such a state of fertility that there will be no danger of bringing an inferior soil to the surface.

It has sometimes been found that, after trenching, the new topsoil was so sour and unfit that it could not be brought into a state of fertility before planting time. In such a case the best thing that can be done is to retrench, in the course of which process the strata of soil are brought back to their original positions.

This operation is of course more than ordinarily laborious, and its cost is out of proportion to the results obtained; yet the grower will know that he has done his very best under the circumstances, and because the subsoil has been worked and exposed to the action of the air for a time, it will be in a far better condition than it was before.

In trenching, the depth of the trench should never be less than 2 feet and the deeper it is the better, provided the subsoil is not too poor.

Some cultivators advocate a trenching depth of from 4 to 5 feet, but this is seldom done in actual practice and it is almost certain that the results gained would be out of proportion to the labor entailed.

Dahlia roots do not penetrate to a very great depth; they are more inclined to be surface feeders. However, the benefit of the deep culture of the soil is indirect; the root run of the plant will be cooler, and the soil will remain moist for a longer period during dry weather, if the soil is deep.

Time of Working the Soil

Not only has the particular method of working the soil to be considered, but also the proper time for doing it; and certain circumstances, which the individual cultivator alone can know about, must be taken into account—such as the situation, kind of soil, etc.

As a general rule, medium to strong soils should be thoroughly prepared in the Fall, or early Winter, the surface being left in a rough condition to encourage the free passage of water and to provide large surfaces to be acted on by the elements.

Medium and heavy soils should never be worked when wet, as they become too closely packed; this will make them stiffer and uncongenial.

Heavy soils should always be dug with narrow spits, as this keeps them more open and allows a freer passage of the air.

In light, sandy soils, the factors of success are depth of working, judicious manuring and proper consolidation before planting.

The deeper a light soil can be worked, the longer it will hold moisture, containing plant food held in suspension. As a natural consequence, the longer will plants stay in good health and growth, especially during the hot, dry Summer months.

But no matter how deep the cultivation may be, the best results will not be obtained from these light soils unless they are consolidated to some extent; this may be done by treading them before planting. This should not be done when the soil is too dry, nor yet when it is too wet, but only when the soil is just moist enough to pack properly.

As is *not* the case with medium and heavy soils, it is best to leave the digging and first preparation of the light soils until Spring.

A cover crop of some kind, or even weeds, should be allowed to stay on the ground throughout the Winter. This will prevent some of the best of the soil from being washed away during the thaws, and from being blown away by the high winds that usually prevail during March; while some plant food may thus be taken out of the soil, the benefits to be derived from the residues of these crops, after they are turned under, will be far in excess of anything that has been taken out of the soil by growing these cover crops.

Early in Spring—say about the first week in April—will be time enough to get the light soils into condition for planting.

The heavier and medium soils that were prepared in the Fall should be prepared again in the Spring. This work is best done by spading them over deeply with a spading fork, breaking up the clods and reducing the soil to as fine a tilth as possible. After this is done, the ground should be kept cultivated and free from weeds until planting time. A run over with the cultivator once a week will keep all these soils in good condition and produce a fine tilth, which is conducive to a high state of fertility.

Manuring

(*See also page* 71)

Hand in hand with the mechanical preparation of the soil must, of course, run the manuring, and this is an aspect of culture that requires most intelligent consideration.

Although concentrated mixtures and special artificial fertilizers are very valuable, they will not do all that is necessary in the production of fine flowers.

In most soils natural manures not only supply plant food, but also improve the physical as well as the chemical condition of the soil.

As a result of the use of natural manures, supplemented with artificial fertilizers, one may confidently anticipate good plants and flowers.

As it is necessary to consider the best time of year for the mechanical working of various soils, so it is necessary to consider the proper time to apply manures. Thus loams and heavy soils, which possess the power of retaining moisture and plant food, should be manured when the ground is prepared in the Fall.

If the soil is deficient in plant food and humus, a very liberal application of general barnyard manure should be applied. This may consist of cow, horse, and other animal manures mixed together, or may be entirely from the cow barn or horse stable as the case may be; the mixed and general manure is, possibly, the richest.

For very stiff, retentive soils, the manure should be rough; that is, it should consist largely of the straw or other bedding material used. A stiff soil needs to be opened up to permit a freer passage of the water and air, and the straw aids materially toward this end.

Coarse ashes may be used with good results for opening up reten-

JEAN TRIMBEE
A semi-cactus variety, native of Canada. Flowers very large and of a beautiful rich Petunia-violet in color.

tive soils, but, of course, their action is almost entirely physical as they contain little if any, plant food.

If there is any choice in the selection of the manure, let that containing long straw be selected for heavy soils, that with a medium amount of straw for the strong loams, and that carrying well rotted and shorter straw for the lighter loams.

When the application of these manures is made in the Fall (when the ground is being prepared) the materials may be comparatively fresh, compared with the manure we would apply to lighter soils in preparing them in the Spring. In the latter case, it should be thoroughly rotted and sweet at the time it is used as its plant food will be wanted in available form soon after it is applied.

Some growers recommend an application of artificial fertilizer in the Fall; if this is given the fertilizer should be of such a nature that it requires a long time to become soluble. Coarse bonemeal applied at this time may be of some benefit as much of it would be available when the plants needed it. But to apply an easily soluble fertilizer in the Fall is only a waste and a needless expense, as much of its plant food would be leached out and carried out of the soil through the drains during the Winter and Spring months when the ground was bare.

In many instances the proper degree of success is not attained because the manure at hand is poor in quality as a result of improper handling.

When natural (animal) manure is stacked in heaps out of doors and exposed to the weather for months, much of its plant food value is lost. Therefore, when a soil is deficient in plant food and the natural manures at hand are not of the best quality, a more liberal application of artificial fertilizers should be applied. But, as noted, this should only be done when preparing the ground in the Spring.

The best concentrated fertilizer, that is, the one I have found most suitable for the production of exhibition flowers, contains among other ingredients, the following:

Nitrogen	2 per cent
Phosphoric acid	10 per cent
Potash	6 per cent

This, it will be seen, is a low percentage of nitrogen. Dahlias do not require as much nitrogen as many other crops. In growing them we are looking for the best flowers on good stems; also for a good crop of roots to carry over the Winter and thus perpetuate the variety. If the soil be rich in humus, too much nitrogen applied in an artificial fertilizer would upset the balance aimed at, and the result would be much foliage at the expense of good flowers with firm stems, and a good crop of firm roots.

On the other hand, phosphoric acid and potash are both highly essential in the production of good flowers and roots.

If it is found that there is a deficiency of nitrogen (the plants showing a poor growth with pale foliage), then it is better to apply it to the individual plants that need it in the form of a stimulant. This may be done in the form of an application of liquid cow manure or a weak solution of nitrate of soda, *but it is only in certain cases* that the latter should ever be applied to Dahlias. If used to any great extent, it causes a weak, forced growth at the expense of fine flowers and good roots.

The roots of plants that have been heavily fed with rich, nitrogenous food, will be found to be very poor keepers; the roots will be soft and will shrivel quickly.

When preparing the ground in the Spring, a concentrated fertilizer, such as a good grade of bonemeal, a high grade of Potato fertilizer, or a special Dahlia food, may be applied, broadcast, over the whole plot, at the rate of 100 pounds to 1000 square feet.

This should be thoroughly incorporated with the soil; most of its elements will then be available when the plants need them most.

Some growers recommend putting a handful of fertilizer in each hole when the roots or plants are set. Unless this is thoroughly mixed with the soil, I do not advocate this practice as there is no chance of this fertilizer being stirred up and reduced to a higher state of solubility by the after cultivation.

Moreover, when the Dahlia plant sends forth its roots, they radiate outward from the stem, so very few feeding roots will be found in the small area where the hole was and in which the root was planted. Also, if the fertilizer is not thoroughly mixed with the soil, the young, growing points of the roots, which are very tender, may get injured; if many of the roots get so affected, a severe check to the whole plant's system results.

Many of the stunted plants seen are caused by too much concentrated fertilizer having come in contact with their roots when they were young. A much better use of this fertilizer would be to spread it as a top-dressing on the surface of the soil; it would then become gradually available, both where and when the roots wanted it.

Plant roots appreciate—and actually do search for—their food, but any that is actually thrust upon them in too liberal doses seems to do more harm than good.

The Compost Heap and Other Vegetable Manures

Now that stable and barnyard manure is becoming scarce in some districts, especially near the cities, it is well for us to look for some other means of supplying the organic matter so much needed by our soils. Hence we may well consider briefly vegetable manures which serve three purposes: First, they loosen the soil, open its pores, and make it lighter; second, they supply nitrogenous food to the roots of the growing plant; third, they yield to the root those saline and earthy matters which exist in decaying plants, in a state peculiarly fitted to enable them to enter rapidly into the circulating systems of new races of plants.

Decayed vegetable matter is really a mixed manure, and its value for enriching the soil must vary considerably with the kind of plants—and with the parts of those plants—of which it is chiefly made up. This is shown by the remarkable difference in the quantity and in quality of the inorganic matter contained in different vegetable substances, as indicated by the ash they leave when burned. Thus if 1000 pounds of sawdust be fermented and applied to a soil, it will enrich it only by the addition of 4½ pounds of saline matter; 1000 pounds of dry leaves from the same kind of tree, also fermented and applied to the soil, will add 82 pounds of inorganic matter.

Independent of the relative effects of the organic matter in each, the fermented leaves would produce a much better effect upon the soil than the sawdust.

It is owing in part to this large quantity of saline and other inorganic matter that they contain, that fermented leaves alone form too strong a dressing for the garden, and that gardeners mix them into a compost.

There are several states in which vegetable matter may be collected by the cultivator with a view to applying it to the land, such as the green state, the dry state, and that state of imperfect natural decay in which it forms peat and is now sold commercially under the name of "humus."

Green Manures

When grass is mown, if it is laid in heaps while green, it very soon heats, ferments and rots; but if it is turned over frequently and dried into hay, it may be kept for a long time without any material alteration.

The same is true of all other vegetables—they all rot more readily in the green state, the reason being that the sap or juice of the green plant soon begins to ferment in the interior of the stem and leaves and speedily communicates the same condition to the moist fibers of the whole plant.

The same rapid decay of green vegetable matter takes place when it is buried in the soil; a green crop of any kind turned into the soil, soon decays into a light, black mold which enriches the soil to a remarkable degree.

We are apt to think that this "green manuring," so commonly practiced by all uptodate farmers is comparatively new, but this is not so. The practice has been in vogue from very early periods, history telling us that this method of enriching the soil was in common use among the ancient Romans.

Buckwheat, rye, the vetches, clover and rape are all sown in this country for the purpose of being plowed in. This should be done at a season when the atmosphere and soil are in such a state as to facilitate decomposition.

That the soil will be richer in vegetable matter, (apart from its better physical condition) after this burial of the crop, than it was before the seed of the crop was sown, can be understood by recollecting that perhaps three-fourths of all the organic matter that is buried has been derived from the air; and that with the natural decay of this vegetable matter, ammonia and nitric acid are produced in the soil, the fertility of which is greatly increased thereby.

The conservation of the soil nitrogen through the agency of crops, is now one of the most generally recognized benefits of the practice of green manuring.

The liability of a soil to lose its nitrates through leaching or draining is very great. By taking up the nitrogen in the soluble nitrate form and converting it into the insoluble organic form where it is safe against immediate loss, the green crops effectually prevent this loss.

By making a compost heap of leaves, vegetable tops, lawn rakings, etc., the skillful and careful gardener can add much of value to the soil.

During the annual Fall and Spring garden cleaning, many tons of valuable material are wasted in the burning of leaves; this is a pernicious habit and should never be done on any place that is large enough to accommodate a compost heap.

Liming the Soil

The use of lime is of the greatest importance in practical gardening. This material has been employed in the form of marl, shells, shell sand, coral, chalk, limestone, quicklime, etc., in almost every country, and, from the most remote periods of history.

Many of the older views respecting the nature of its action have been exploded; we now see that its action is more or less indirect.

It is probably seldom that a soil lacks the necessary amount of lime for the successful culture of Dahlias.

Its chief action is in ameliorating the mechanical properties of the soil, and in setting free other plant foods, such as potash, etc. The fact that it is very destructive to the organic matter in the soil is a consideration that should render us very cautious in applying it indiscriminately.

Great though the benefits of lime are, it will be best to apply it chiefly to soils whose mechanical condition is such as will be greatly improved by it. In the case of most new land, turned up after a long period as pasture, it is indispensable; also in that of soils extremely rich in peat and organic matter.

On the other hand, its use on soils in a high state of cultivation, except in very small quantities and in very finely pulverized form, is not as a rule to be recommended.

Lime, especially caustic lime, should never be used along with a manure containing ammonia in any form, the reason being that the ammonia, when brought into contact with lime, is at once set free, escapes into the air, and is lost.

The only forms in which lime may be safely mixed with ammonia salts are those of phosphate or sulphate. The latter form (which is called *gypsum*) is an extremely valuable fixer of ammonia, offsetting its tendency to volatilize.

Improvement of Soils by Drainage

While Dahlias enjoy plenty of water in the growing season, yet they are like most other garden crops in that they resent having wet feet, and will not do well in soil that does not drain quickly.

Much soil that is unfit for good culture may be easily improved by draining.

Land is drained with the object of promoting the free percolation of water and air.

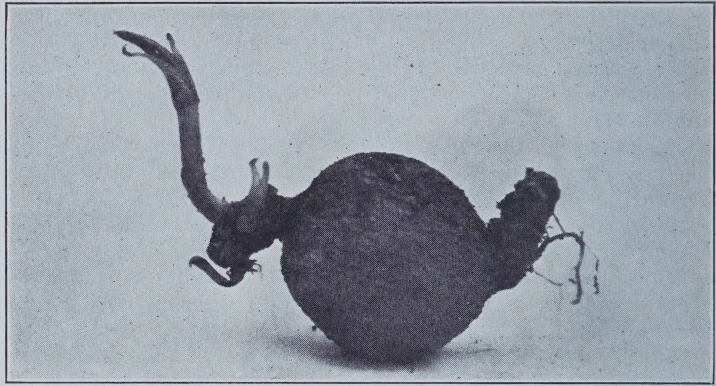
Sandy soils (by virtue of their texture), some lands (because of their slope), and still others (in the character of their subsoil) are said to be *naturally well drained.*

Many soils, on the other hand, have to be subjected to some system of artificial drainage.

Various indications serve to show when land needs draining; if, after a fall of rain, the water collects in puddles on the surface and remains there until it evaporates, it shows that the drainage is bad.

Land of this kind will work badly under the plow or spade, but rushes, sedges and other bog-loving weeds will thrive in it.

Artificial drainage is best accomplished with drain tiles, which are made of burnt clay. These are placed end to end at a suitable depth,



A ROOT WITH A SPROUT TOO LONG FOR PLANTING

Such a sprout may be cut off, when others will appear. This root, though hardly a representative one, is firm, healthy and vigorous. Small roots are just as good as large ones.

with a gentle inclination (not less than 1 foot in 200 along the entire course) in the same direction as the slope of the surface.

There is a relationship between the depth of the drains and their distance apart; the nearer they are laid to the surface, the closer should the lines of pipe be brought together.

In a very light soil, a single drain at a suitable depth may serve to control a large area; in a stiff clay, however, the drains may need to be laid only 15 feet apart, and not more than 3 feet below the surface.

In practice, on heavy land, 21 feet is an ordinary distance apart, with a depth of 3 to 3½ feet. On light lands the distance apart may be extended to 60 feet.

These drains, which are called the "laterals," should be connected with main drains, which should be 3 inches lower than the laterals. The mains are led into the brook or ditch, which must be kept open.

In land that drains freely, the water that fills the drains comes from below rather than from above.

It is a familiar fact, proved in the sinking of wells, that at a certain depth water is reached. This is called the "water table" and its surface oscillates, approaching nearer the surface of the ground after heavy rains and receding during droughts.

The chief function of the drains in light soil with a relatively shallow water table is, therefore, to tap this reservoir of underground water and so prevent the water table from rising to such a height that moisture would stagnate about the roots of the plants and hinder their growth.

PROPAGATION OF THE DAHLIA

THERE are three principal methods of propagating the Dahlia, namely: by division, by cuttings, and by seed. Grafting may be done, but this is an exceptional method, and is not generally practiced.

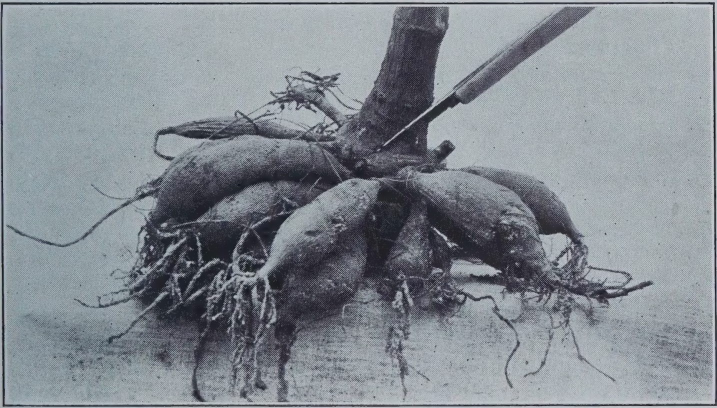
Propagation by Division

When one has a good stock of a variety, the division of the clump is the common method of increasing it.

On examining the clump it will be seen that the fleshy roots (commonly called tubers, though they are not real tubers but really thickened roots) are attached to the main stem, and radiate from it.

At the junction of the root and stem there will be seen a swelling; this is called the "crown," and it is on this crown that the eyes, which will eventually form the new shoot, are to be found. In detaching these roots, it is imperative that this crown be saved intact.

Some varieties do not have this crown so well defined. In some cases, the eyes will be seen to arise from the live portion of the old stem;



AN UNDIVIDED CLUMP READY FOR DIVISION

The knife blade shows just where the first cut should be made. At this stage use a very sharp knife, great care, considerable caution, and generous consideration for every eye and every root.

in these circumstances a portion of the old stem has to be cut with the root to support the eye.

As every root will not form eyes, it is best for the beginner to wait until growth has started in the Spring (when the eyes will be more prominent) before dividing the clump.

During the latter part of March and early in April, the eyes usually begin to show; but sometimes it will be necessary to remove the clumps from the storage place and place them in a warmer and moister place, in order to make the eyes become visible.

Before dividing a clump, it is best to wash it with a good stream of water from the hose; then examine and study it carefully. First remove all undesirable and broken-necked roots; then, with a good, strong, thin-bladed knife, sever the roots that show well developed eyes from the parent stem, *being sure that the crown with a portion of the old stem is attached.*

If there are some roots that do not show any eyes or buds, leave them on the clump; in a week or so later most of them will have developed eyes, provided they are not what is known as "blind roots."

Some people wait until planting time before dividing their clumps, but then if planting is late, the shoots will have become too long and will no doubt be injured when the cutting is done.

If there are long shoots on the roots before they are divided, they should never be torn off, but should be cut back to near the crown, when they will sprout again. If they are torn off, the whole crown and many dormant eyes will be permanently injured.

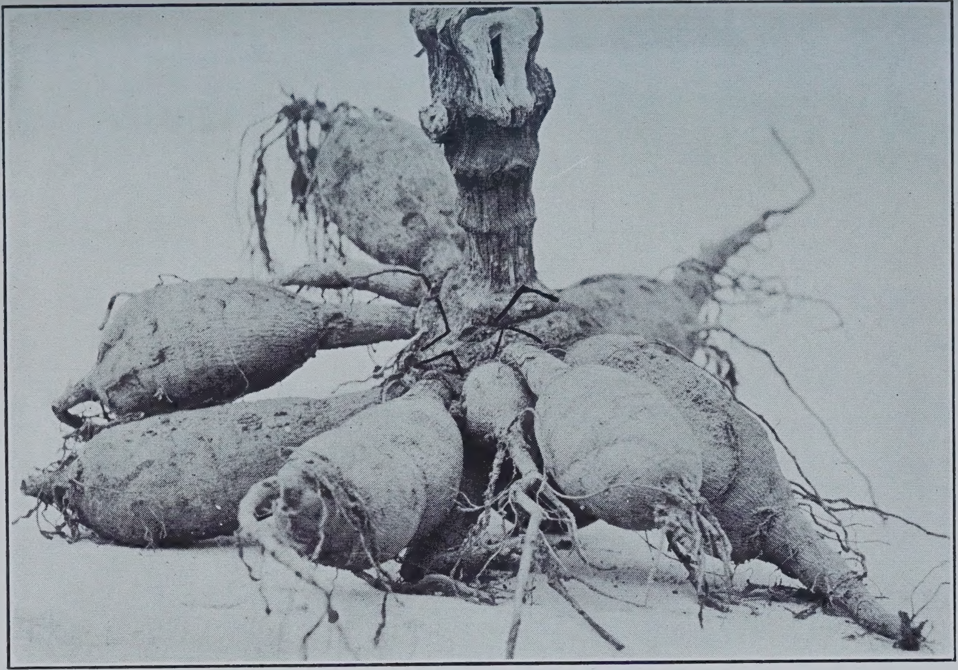
After dividing, the severed roots should be carefully laid away in dry soil or sand and kept in a cool place until wanted for planting.

Never cut too close to an eye. Sometimes a root that apparently had a good eye will refuse to develop any further. This may be caused by the eye being injured, or by cutting being done too close to it; for two roots may have been very close together so that the eye really belonged to the root adjoining that on which it appeared. Of course, when severed from the root which was supporting it, it very soon dies. When in doubt as to which root an eye really belongs to, always leave both. If, subsequently, both later develop well defined eyes, they may then be divided.

TOOLS REQUIRED. Good tools are required for a careful cutting up, but the following will be found to be all that is necessary:

(1) A small pruning saw for cutting off the old, woody stem. If the stem is not too large, a pair of lopping shears will do very well.

(2) A pair of pruning shears for cutting off all shriveled and broken-necked roots.



A STRONG, UNDIVIDED DAHLIA CLUMP

The marks show where cuts should be made in dividing it. Within each V-shaped space the eyes are just beginning to show. Note the strong, single stem. This clump was grown from a cutting.

(3) A good, strong, sharp, thin-bladed knife.

Sometimes, especially with very large clumps, it is necessary that they first be divided in two; a hack saw will be found very useful for this purpose.

Broken-Necked Roots. Always discard all roots that are injured or broken at the necks.

Some varieties have very long, slender necks, and these should be very carefully handled at all times to prevent straining or any rupture of the skin.

Strained and broken necks are usually caused by careless handling at digging time. The injury may not be apparent at the time—but if the neck is strained and the skin is broken, the result shows in the Springtime. Then, if the buds do start, there will not be a proper flow of nourishment from the root to the shoot, and the result—if the shoot grows at all—will be a weak, puny plant.

Before planting a root, always cut off about one-third of it. This will usually result in a better plant.

The old root is only needed to sustain the young plant until the new shoot has sent out roots of its own (the feeding roots), and if the root that is planted is very large and whole, new roots seem to take longer to form, and sometimes do not form at all. In such cases it seems that the shoot says: "What is the use of me sending out roots when I can get all the food I need without doing so?"

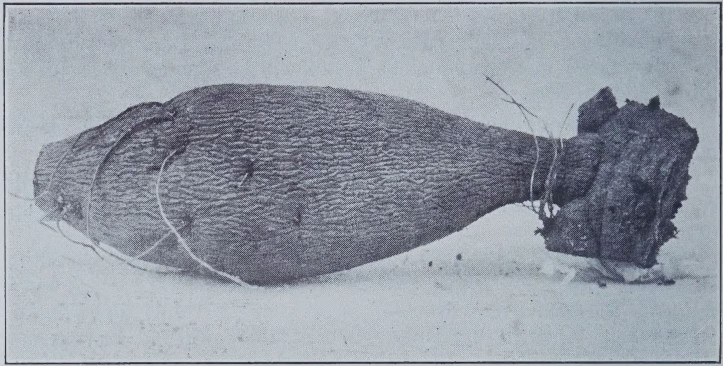
If the root is not cut at planting time it will not decay, but will be lifted again in the Fall, when it will be known as a "mother root." If this root be used again it will make a very inferior plant.

It has often been demonstrated in actual practice that the size of the root is no great factor in the ultimate success of the plant. A good, healthy small root sometimes is better than a very large coarse root which may contain less substance for nourishing the plant than the smaller root.

Many large roots are hollow in the center and sometimes may rot even before the shoot develops; they are also sometimes very woody and consequently devoid of sap.

In keeping the cut roots prior to planting time, care should be taken not to allow them to become too dry. If kept in too dry a place, much of their moisture will be evaporated from them. The planting of these dry roots invariably results in poor plants, many of them becoming stunted in growth.

If the roots are found to be dry at planting time, they should be soaked in water for a day or so before being planted. They will then become plump and will put forth new roots much sooner.



A DIVIDED ROOT OF FINE QUALITY AND CONFORMATION
Two eyes can be seen as dark spots on the crown portion at right—one on the top, the other exactly in the center. Plant roots horizontally, in all cases.

A good, healthy root that has more than one eye on it may sometimes be divided into as many pieces as there are eyes, but this is, of course, a very delicate operation and must be performed with great care. It should be done only at planting time, for these pieces of roots dry out rapidly and soon become worthless. If this root division *is* done before planting time, however, the pieces may be potted, grown along like young plants and set out at the desired time.

Propagation by Cuttings

For the more rapid increase of rare and new varieties and also for the production of extra fine exhibition blooms, properly grown, healthy young plants are recommended.

The process is simple enough for those who have the proper facilities; the work is usually carried out in the greenhouse, although it may also be done in a limited way in hotbeds and coldframes.

Green Plants versus Roots

There has for some time been quite some discussion of the subject of green plants versus roots. Those who depend on roots alone have condemned the plant method of propagation and have accused those who practice it of being guilty of overpropagation.

I have often wondered why it is that of all the plants we grow by the young plant method, the Dahlia should be the only one to be called overpropagated. With this flower the failure of some plants to do well, no matter what the cause may be, is always blamed on overpropagation.

I claim that there is far more danger from *wrong* propagation than from overpropagation.

A grower who selects his stock for propagation, using only the roots of those plants that were absolutely healthy and true to type, can do more to build up healthy selected stock than can those who rely solely on the division of the roots.

Plants propagated from cuttings are entirely new individuals and being dependent solely on their own roots for support, must of necessity build up good root systems to provide this support.

They have the same characteristics as the parent plant, but no diseases or insect pests will be perpetuated. As a grower of exhibition flowers for many years, I am a firm believer in the use of green plants.

They have many things in their favor: They can be rooted at such a time that they will be ready for planting at the proper time; they are above ground from the time they are set out, and consequently can be cultivated as often as necessary, while a root is sometimes three or four weeks in the ground before the shoot appears and all that time may be forgotten and receive little or no care.

Shoots from root divisions sometimes fail to make roots quickly, depending on the mother root for their support; but the young plant has a root system of its own and, if conditions are at all favorable, starts growing immediately.

As a rule, the flowers produced by green plants are larger, and better, and it is a well known fact that nearly all exhibitors get their best flowers from such plants.

One reason why some people do not succeed with green plants is because they do not plant them deep enough. Plants set out from 2½ inch pots, should be set at least twice as deep as they were in the pots; that is, the ball of the plant would be set from 4 to 5 inches below the finished level of the ground.

Another reason why some people fail with them is that they use inferior plants. Plants may send out roots from between the joints or nodes, but they would not make many, if any, new roots, for it is only at the joints that the tuberous roots which have latent buds on them are produced.

Plants that have been forced and drawn up by excessive heat and moisture never make good specimens.

It has often been said by those who condemn the green plant method of culture, that green plants do not make roots for carrying over the Winter. In my own long experience I have not found this to be so. On the contrary, I have often seen plants growing side by side, one from a root and the other from a green plant, and when dug in the Fall, the one from the green plant invariably had a better crop, with cleaner roots, than the one grown from a divided root.

I have just (November 8, 1924) finished digging my roots for this year, and I have over ten tons of roots from an acre of ground, all from specimens grown from green plants.

It is true that there are some varieties that do not make any increase; but results from these are usually equally bad whichever method of culture is employed.

If the proper kind of cuttings are made at the proper time and are cared for in the right manner, a very little experience will soon demonstrate the superiority of green plants.

Cuttings made from the tops of other cuttings and planted out late, will *not* make a good crop of roots, and this practice I must condemn.

Time of Propagation

The Dahlia requires a certain period of rest, as after the clumps are dug, a chemical change takes place in the roots; they should not therefore be brought into heat too early.

The latter part of February, or early in March, I have found to be soon enough for most varieties, and if a limited number is required, April will be soon enough.

The clumps when brought into the greenhouse, may be divided into generous sized pieces, or they may be left intact.

A very large, deep clump is better divided, for often the shoots will start so low down that they would be buried too deep to make it possible to get the proper kind of cuttings from them.

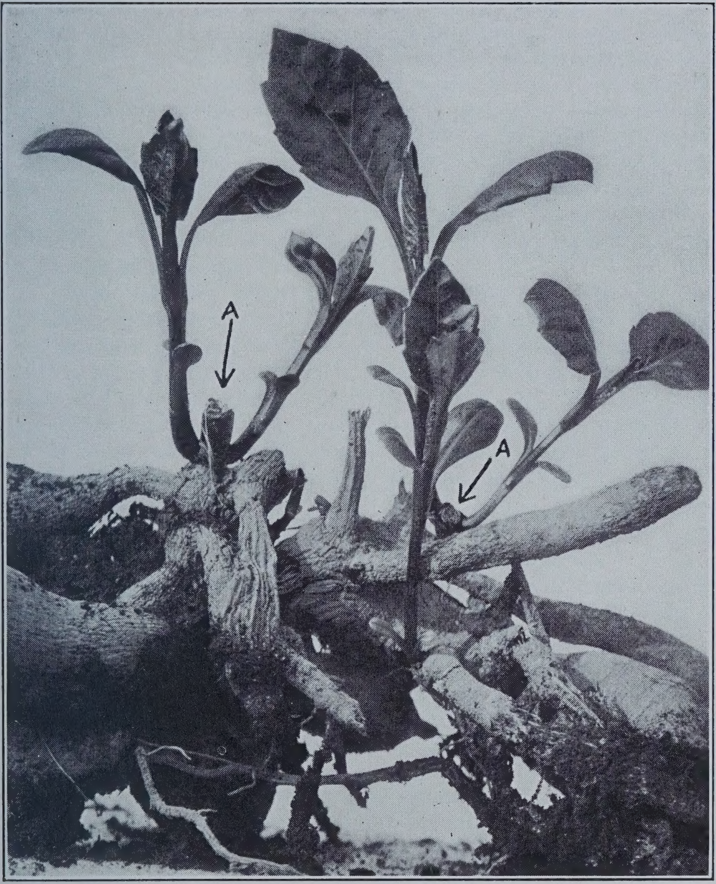
The roots may be placed in boxes or directly on the bench. I prefer to use boxes for they can be moved about without disturbing the clumps.

Fine light soil should be packed in around and between the roots, leaving as many of the crowns as possible above the surface; this will facilitate the more careful taking off of the proper kind of cuttings.

Water should be applied sparingly at first, as at this time of the year there is not much evaporation, and too much moisture will rot the roots.

They must not be forced in any way, hence too high a temperature should be avoided; about 60 deg. F. has been found to be a congenial temperature.

In a few weeks they will begin to sprout, and when the young shoots are long enough to handle easily, they should be taken off with a sharp



A CLUMP WITH SHOOTS READY TO BE TAKEN OFF AS CUTTINGS

The arrows (A) point to where cuttings have already been removed, and where, in each case, two new cuttings have developed. To produce stocky cuttings, don't bury your clumps while the shoots are starting

knife, leaving the base of the young shoot, with two scalelike leaves. From these two more sprouts will very soon appear.

The cuttings should never be broken off; if they are the whole crown with the latent buds thereon will probably be totally destroyed.

I prefer the cuttings very small, just large enough to handle easily. One can then get a much shorter-jointed cutting with short internodes, or distances between the joints, which is preferable to one with long internodes. The former will not only root more easily and quickly, but they will also make much better plants. Bear in mind that it is only at the nodes or joints of the stem (which will be underground) that the roots form that have eyes on them. There is a much better chance of having several nodes below the ground, after the plant is planted, if a short-jointed cutting is used.

This is another reason why the roots or clumps from which the cuttings are to be taken should not have their crowns buried, for one can see much better just where to cut off the shoot. Again, if the crowns are buried, the cuttings will necessarily be long, as they must be at least 2 or 3 inches above the surface before being removed. If they are cut under the ground, other eyes may be injured. Also the base of the shoot under the soil will be bleached and as bleached cuttings are usually thick and fleshy, they make poor plants if, indeed, they do not damp off in the bed.

ROOTING THE CUTTINGS

The cuttings are rooted in the propagating bed in which a layer of ashes an inch or so thick has been placed to facilitate drainage; on this should be about 3 inches of sharp river or pit sand.

Here they are placed in rows from 2 to 3 inches apart. They should be shaded from the direct sun by cheesecloth, which should always be removed during the night to relieve the excessive condensation.

The bottom heat temperature of the propagating bed should be from 65 deg. to 70 deg. F. and the top heat in the house from 55 deg. to 60 deg. If too much heat and moisture are used, damping off will occur. This is caused by a fungus which requires moisture for its rapid propagation; if it appears, then something is wrong with the conditions and the only cure is to change them.

The cuttings should be well watered when they are put in the bed. This will suffice for some time, and afterward they should only be watered sufficiently to prevent wilting. A light spraying overhead each day will often be all that is necessary.

Some varieties take longer to root than others; likewise, some cuttings of the same variety will root quicker than others, the different stages of development of the shoots having some bearing on this. Also some parts of the propagating bed will be found more suitable and will root the cuttings quicker than others.

As a general rule, cuttings usually take from two to three weeks, although I have often found some varieties to root in ten days.

Damping Off. Beginners usually have trouble with this disease, which is the only malady that attacks the cuttings. As I have said, it is caused by a fungus and an attack is usually caused by wrong conditions. Gardeners with experience know how to reduce its ravages to the minimum. If the conditions cannot be changed and the disease still persists, the sand should be saturated with a solution of permanganate of potash, one ounce to the gallon of water. All woodwork as well as the sand should be thoroughly saturated, and the bed should be allowed to dry out for a few days before any more cuttings are put in. This will usually be found a very safe and reliable remedy.

The proper kind of cuttings have also something to do with the liability to damping off. Those that are weak and too soft will be found to damp off very readily, but experience will soon show what is the proper kind of cutting to use.

Potting the Young Plants

One who has had experience can easily tell when the cuttings are sufficiently rooted, by their appearance, as they begin to show signs of being established and of growing. They should then be carefully removed by digging under them with a small trowel or thin piece of wood. Any that are not quite ready may be put back again in the sand.

The rooted cuttings may be put into flats, about 4 inches apart each way, or they may be potted up singly in 2¼ or 2½ inch pots.

Most growers recommend and use a light, sandy soil for this first potting, but this I do not advocate, as the lighter the soil, the quicker and weaker the growth that will result.

I personally use a medium loam for this potting—almost the same as is used in the bench for the culture of Carnations or other crops. Of course, it must be finely pulverized.

If plants are grown to be shipped to a distance, they will carry much better if this loam is used instead of the light, sandy soil so commonly used by florists; also, the plants if given plenty of air, will have a much tougher and better foliage, and will be stockier and sturdier as a result of their slower growth.

After the plants are potted, they should be stood close together on a good, light bench with a cool bottom of soil or ashes; this will prevent them from drying out too fast. They should be shaded from the direct sunshine for a day or two, and kept in a temperature of 60 deg. until they have begun to take hold of the soil, when they may be given plenty of air and full sunshine. If the temperature can be reduced to 50 deg., so much the better.

The soil in the pots should be kept in a nice, moist condition and care must be taken that the plants are not overwatered; neither should they ever be allowed to suffer for want of water, or they will begin to harden—a condition that should at all times be avoided. As soon as a Dahlia plant begins to harden for want of water or from any other cause, it might as well be thrown away as it will not make a good plant.

From the time the cutting is rooted, a Dahlia plant should never be allowed to stand still, neither in the pot nor in the garden. For best results it must be kept growing.

The above notes on propagation have been written principally for those who have the use of a greenhouse, but similar results can be obtained through the use of a hotbed, although, of course, the work may be a little more arduous.

In this case, the bed should not be too hot, a nice gentle heat being all that is required. The first violent heat should be allowed to escape before the cuttings are put in.

The cuttings are best put into flats, which are filled with sand and stood on the surface of the bed. This is better than putting the cuttings directly into sand placed on the surface of the manure, for the manure will be settling all the time. Also, if the heat should go out too fast and be exhausted before the cuttings are rooted, the box can be moved to a new bed.

Cuttings may also be rooted nicely by putting them directly into small pots and plunging these in the hotbed.

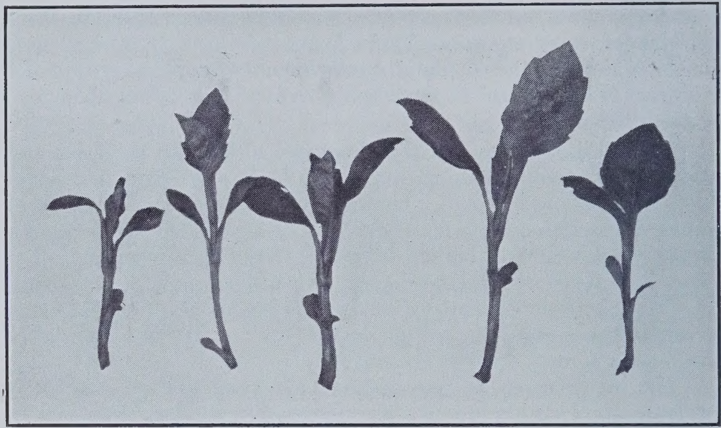
Several may be put around the edge of a 4-inch pot (or smaller pots may be used) filled with light soil. When the cutting is inserted, a thick dibble is used; this makes the hole wider than is required for the cutting. This hole is filled with sand when the cutting is put in.

The other details of the procedure are much the same as when the work is done in the greenhouse (and as described above).

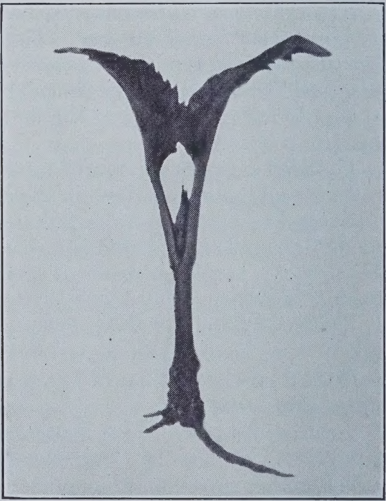
A mild hotbed will also be found an excellent place for starting the clumps into growth.

In using frames for propagation, great care must be used in ventilating them. There is a much smaller amount of atmosphere in a frame than in a greenhouse, consequently the admission and regulation of fresh air must be carefully watched.

After the plants have become established, they should from time



Trimmed cuttings ready to be put in the sand. Always use a sharp knife in making cuttings; do not try to break them off. The smaller and shorter-jointed the cuttings are, the better are the chances of their making good plants.



A good healthy cutting, callused, rooted and ready to pot. This stage is generally reached in from two to three weeks. If desired the cuttings may be put in flats 4 inches apart each way instead of singly in pots. Medium loam is likely to give better results than light sandy soil.

FIRST STEPS IN PROPAGATING BY CUTTINGS.

to time be given more room, plenty of air and sunshine at all times. When they are large enough, and when the weather permits, they may be moved to a coldframe to keep them growing stocky, and to harden them off gradually, preparatory to planting them out in their permanent quarters.

Cuttings from Young Seedlings

Before leaving this subject of young plants, I would like, if possible, to correct an impression that many growers and writers on the subject have about the taking of cuttings from seedling plants the first year.

Some writers have said that the taking of cuttings from a seedling the first year has been the means of weakening the stock of the variety so that it has become worthless; and they have even fixed the time limit, as four years, before which a seedling should not be propagated from. They say that a seedling is not properly fixed until it has been increased by division for a period of four years.

This has been repeated many times in various books and articles, yet I have never seen any scientific reason given for the statement. I claim it to be entirely erroneous and have proved it so many times in actual experience.

Why should a seedling need to be "fixed?"

A sport has always to be fixed, and for several years it will have a tendency to revert to the original type whence it sported. Only by careful selection for several years can the sport be fixed.

A seedling, however, is not a sport, but an entirely new individual. It has inherent within itself its own characteristics and I claim that if there is any record of a seedling having been ruined by propagation by cuttings, then either it was wrongly propagated, or the characteristics that were shown later in the propagated plants were already inherent in the parent plant, although it might not have had time to show them.

If a seedling is not of high standard, then to raise young plants from it would not improve it any; neither would its propagation by division improve it.

Dahlias do better some seasons than others, and it is well that seedlings should be tested out for several seasons, and in different localities and soils before they are put on the market; but the method of propagation has nothing whatever to do with this.

Sometimes a seedling that was a perfect Decorative the first year, will throw a few single or Peony flowers the second year. Very likely this is blamed on the propagation, although just as many do this if divided only. The cause, in any case, might be something wrong in the culture; or the variation might be due to the season.

I claim that the original plant had this characteristic inherent within it, and if it did not show it the first year, it was simply that it did not have the time, or that the later conditions were more favorable for it.

If seedlings are started early and planted out as early as the season will allow, they will start to bloom late in July or early in August, and will keep on blooming until frost. If a seedling does this without any variation in the type of flower, then one can safely anticipate that the type will be repeated in future years no matter what system is used in its propagation.

On the other hand, if seedlings be late in coming into bloom (say September for the first flowers) and thus have only one or two flowers open before being cut down by frost, then one will not be certain as to all the characteristics that this seedling will have.

I have propagated from seedlings during the Summer, just as soon as I found how good they were, and have had as many as twenty-five of a particular variety the first year, instead of one. Moreover, these Summer-rooted plants all came true to type, and produced exhibition flowers the following year.

I have also taken the tops of young seedlings out of the seed bed and rooted them, getting two plants instead of one the first year, and no one could tell them apart. If there is anything about this bugaboo of overpropagation and the fixing of seedlings, then I should have ruined my best varieties years ago, for I have conducted these experiments with my very best sorts.

Another erroneous impression that some people have is that it is wrong to take cuttings from plants that were cutting the year previous.

Again no scientific reason is given for this statement, and in my many years of practical experience, with all kinds of plants, as well as with the Dahlia, I have failed to find any foundation for the theory. If there was any foundation, then I should have ruined my whole stock instead of improving it as I have done, for all of my stock has been grown from plants, and I have had nothing to propagate from but plants that were cuttings the previous year.

I believe that there are far more varieties ruined by the improper keeping of the roots during the Winter, and by the planting of dried up, poor quality roots than by the practice of propagating by cuttings.

No good gardener would dream of using poor or weak stock for propagation. His aim if he is worthy of the name, is ever to improve his stock by selection. If poor stock is used for propagation, that is, if it is a weak plant, whether developed from a root, or a cutting, then weak and poor stock will be the ultimate result.

Propagation by Seed and the Raising of New Varieties

The raising of seedlings is being done now by nearly all growers and lovers of the Dahlia, and there is no keener pleasure to be derived than that of raising a batch of seedlings.

The Dahlia plant is such a complex organism, and the varieties have been so much intercrossed, that the Dahlia as we know it today is a real hybrid. Of the thousands raised annually from seed, I do not think there are two that are exactly alike. They may resemble, somewhat, some that have been produced before, but there will be some point of difference, either in foliage, color of the flower, formation, stem, or root.

The Cost and Reward of Hybridizing

It is this mystery that the Dahlia seed contains that makes the raising of seedlings so fascinating, and this apart from the possibility of getting something really worth while—better, if possible, than anything that has heretofore been produced.

If a good strain of seed has been used, there will be some very fine cut flowers produced that will help to repay one for the trouble encountered in raising them.

I have no patience with those people, who call themselves creators. There is only one Creator, and all that the hybridist can do is to assist nature—if putting the pollen of one variety on the stigma of another can be called "assisting nature."

Sometimes it is much better to let nature alone. Some of the very best seedlings that have ever been produced are chance seedlings; one could only guess at their parentage. All the credit the grower is entitled to for this is that he or she had enough knowledge of other varieties to recognize the superiority of this variety; to select it, and properly to care for it after it was selected.

There are some people who want to start in the Dahlia business via the seedling method. They have heard of the high prices that some new varieties have brought, forgetting (or not knowing) that these varieties were produced only after many years of painstaking work, of careful selection and the raising of thousands of plants. All this took acres of land and consequently much money.

No one is ever paid enough in cash, even if the prices asked for new varieties are high, to pay for the labor and expense involved in bringing out a new variety. For it is only during the first year, when it is a novelty, that the introducer is the sole beneficiary; after it is once on the market, price cutting and trading begin. Even amateurs who, to keep their status as amateurs do not sell for money, do not hesitate to divide and "swap" with one another. All this tends to keep down the amount that the introducer of a new variety is entitled to—and what the general public thinks he is getting. But the pleasure derived, and the fact that he has been instrumental in improving the standard, is greater compensation than the monetary remuneration received.

Before a hybridist starts to select varieties to be introduced as new, he should have a real knowledge of what has already been produced.

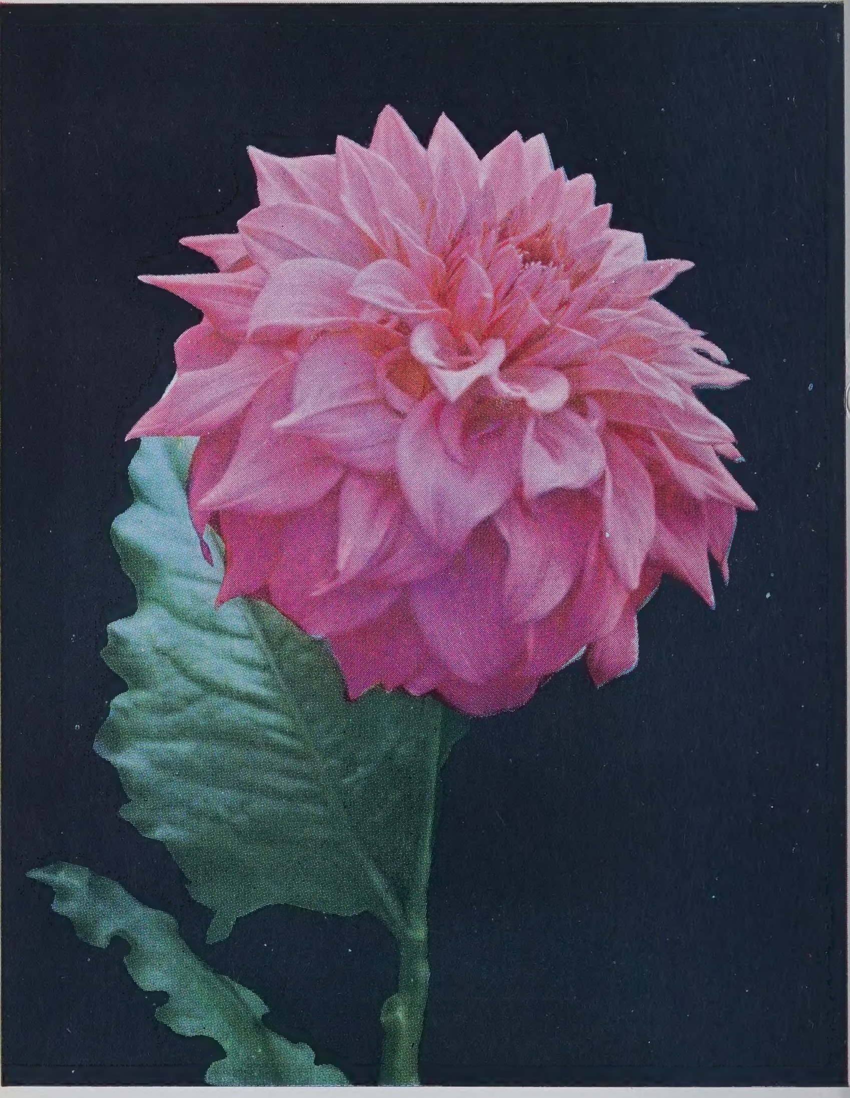
There are thousands of varieties in existence today. A book has just been published containing 7,000 names, and many more have been added since its appearance. It is, of course, impossible for any one person to know them all intimately; yet he should know as many of them as he can, especially the later, more uptodate varieties. It is, therefore, poor judgment to start in the Dahlia business by the seedling method, for one would then be working entirely in the dark.

The improvement of the Dahlia is making wonderful strides and within the past few years some very fine varieties have been introduced, but there is still room for improvement. The stems have been improved greatly within the past decade and the time is not far distant when all Dahlias for exhibition or cut flower purposes will have stems equal to those of the Chrysanthemum.

In my own young days the Chrysanthemum itself did not have any too good a stem; at exhibitions blooms were shown on boards with the stems cut short and the flowers resting on the flat surface. After the rules were changed to call for longer stems, there was soon a marked change in the quality of the stems of the new varieties. The raisers of new varieties found it not worth while to save any variety that did not have a stem stiff enough to hold the flower erect.

I believe it to be the same with the Dahlia, and that the sooner the American Dahlia Society and all other societies do away with the showing of flowers on short stems (which is an abomination at best), the sooner will all weak-stemmed varieties be discarded. The Dahlia Society of New Jersey has already adopted this attitude, and for the past two years has barred short stems entirely from competition.

There should never be permitted in a show which has for its object



JERSEY'S IDEAL

Best described as a lavender-pink in color, although it varies to Phlox pink. It is a vigorous grower, with large, leathery leaves, almost insect proof. The large flowers are produced very freely the improvement of the Dahlia, a variety that has to have a wire to hold it erect. Neither is it fair to the patrons of these shows, be they beginners or buyers of experience, to show these flowers with short stems, or with hidden wires.

There are plenty of varieties now of all colors and types that have good stems, so why perpetuate and encourage those with undesirable stems?

"Only the Best Seed Should Be Selected"

It is only a waste of time to use inferior seed, that is, seed from undesirable and inferior varieties. The best results are usually obtained by the saving of your own seed.

Seed should be saved only from those varieties that have the best of qualities: good stem and habit of growth, good formation, and last (and very important, though it has not been kept any too well in mind) a good root system. That is, it should be a good tuber maker, for it is a lamentable fact that many of our best new varieties introduced in recent years do not have this attribute. Consequently the price remains high. This and the fact that one may pay a good price for a new variety to find that only by some special method or treatment can he keep it throughout the Winter, does much to discourage the purchase of new varieties.

All these points can be controlled to a certain degree by the proper selection of the seed parents, but I do not know of any one who has been able to control the color.

We may aim for a pink and get a yellow; or try for a white and get a red, and so on. But the colors are more or less all beautiful, so let us select more with a view to an improved habit. The color will take care of itself.

Some varieties do not produce seed readily. I have never yet been able to get a seed pod on that really splendid Holland variety, Insulinde, and I have tried it every year since it was first introduced. Some flowers are really mules, and have small petaloids where the sexual organs should be.

If cross-fertilization is resorted to, it should not be done unti early in September. The seed matures very rapidly at this time; the plants have then reached their maturity and it is more natural for them to complete their life history by producing seed.

One of the best methods, I find, of producing good seed is really to let nature take its own course. I plant in an isolated place, as far away as possible from all other sorts, those varieties I have selected for breeding. If a variety that I want to use as a male parent does not happen to be in bloom I cut a flower that is in the right condition, place it in water near the one selected as a female parent (changing the flower as needed) and allow the bees and butterflies to do the fertilizing.

By planting these Dahlias in an isolated place and allowing the insects to do the work, I have been able to get as high as 80 per cent of good flowers from the resulting seedlings. Of course one must have quite a large place to carry out this method, as the breeding plot should be at least several hundred yards away from all undesirable varieties. It should especially be kept as far as possible from the seedling patch where all kinds of nondescripts (which are usually very prolific in their seed bearing) might be in bloom.

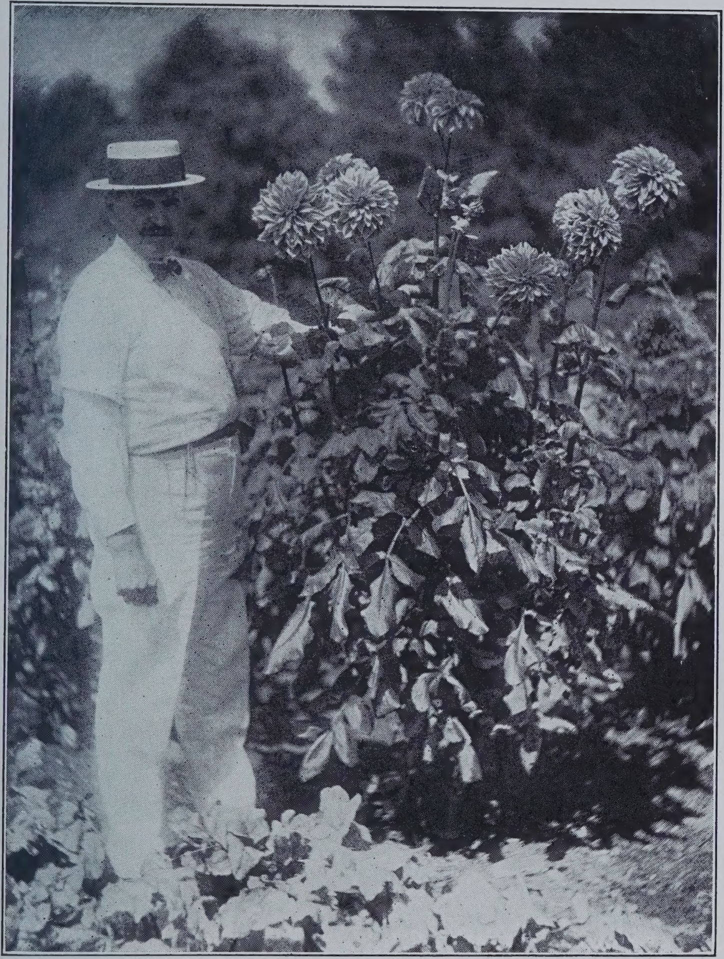
If one has only a small plot of Dahlias and all good varieties, then by saving a seed pod from one or two of the best there will be insured a good percentage of desirable varieties. This is the method most generally practiced and I was interested in reading in Mrs. Edward Harding's splendid book on the Peony, that it has also been practiced by M. Crousse, who has raised and introduced many of the best varieties of that plant. In a letter to Mrs. Harding, he states: "I started my first seedlings about 1869. I did not then have time to employ artificial fertilization, therefore I proceeded differently. I omitted from my collection all flowers of inferior quality, leaving only the strictest selection of the most beautiful varieties.

"I harvested and sowed, as soon as they ripened, all the seeds which were produced. It was always thus that I proceeded whenever I wished to secure seedlings. I had at the time one of the most complete and well-chosen collections. I grew as many seedlings as possible, according to the space at my disposal."

And Mrs. Harding goes on to say: "When one considers that out of about fifty-five seedlings placed in commerce by Crousse between 1873 and 1880 more than half are still considered to be of the finest quality, and that out of this number at least a dozen are to be classed among the world's best, the achievement of M. Crousse is astounding. Quite apart from the greater excellence of the flowers, the importance of planting only the choicest varieties obtainable is here emphasized for all who are interested in producing new varieties."

The seed pods should be cut when ripe and hung in a cool, airy place to properly mature; if frost threatens before they are fully ripe, they may be cut with long enough stems to permit them to conveniently be placed in a vase of water. If the water be changed frequently and the vase kept in a light, sunny place away from danger of frost, many of the seeds will mature.

The seed should be cleaned when fully ripe (it will fall out easily



A SINGLE PLANT OF JERSEY'S BEAUTY—AND THE AUTHOR

Note the strong, erect stems that hold the flowers up in the air where they can breathe and where all can see them. These are typical disbudded flowers, and the plant is a typical result of intelligent pruning and careful culture.

from the composite flower heads) and then be kept in sealed bottles or tins until ready for use in the Spring.

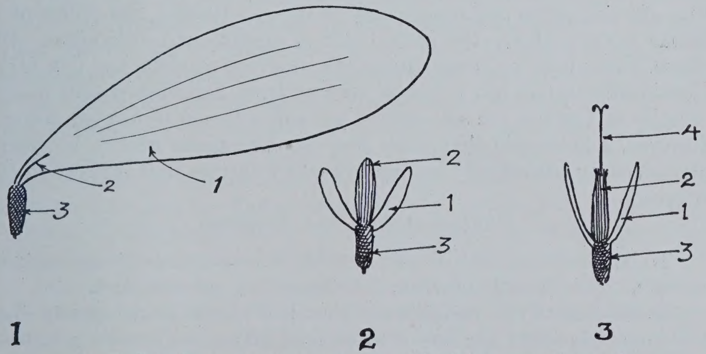
HAND FERTILIZATION

Breeding may be done in two general ways: (1) saving seeds from flowers that have been pollinated by insects, as described on page 50, and (2) hybridization or hand pollination. The former is easy while the latter is relatively difficult. Before one undertakes to do any hand pollination, he should at least have an elementary knowledge of the structure of the flower.

Flowers are made up of the following: Sepals which form the calyx; petals which form the corolla; stamens on which are the anthers and where will be found the pollen grains; pistil, the point of which is called the stigma. The pistil is attached directly to the ovary which will eventually contain the seed.

The ovary and stigma is analagous to the female part of the flower, and the stamens and pollen grains are analagous to the male. When the pollen grain reaches the stigma, either by the aid of insects or by hand, if the pollen grain be ripe and the stigma receptive, the pollen grain germinates and its protoplasm eventually reaches the ovary and becomes fertilized.

The Dahlia belongs to the plant family of compositae which has flower heads composed of many florets or a composite of flowers; thus the sexual organs are somewhat difficult to see, but if a larger individual flower, such as a lily, be dissected, all these various organs will be readily seen. The Dahlia flower, however, has two different types of florets, called the ray and the disc.



(1)—1, Ray floret; 2, stigma; 3, ovary which becomes the seed
(2)—Disc floret. 1, Rudimentary petals; 2, stamens; 3, ovary
(3)—Disc floret when ready to be fertilized. 1, Rudimentary petals; 2, stamens; 3, ovary; 4, stigma

The ray floret has a completely developed petal which is the conspicuous part of the bloom. In a single type of Dahlia we only have one or, at the most, two rows of these ray florets, the rest being all disc florets, while in the so-called double flowered types, such as the decorative, cactus, etc., the entire flower is practically made up of ray florets.

The ray florets are not complete, as they have no stamens, but in many types they have pistils and ovaries and if fertilized are capable of producing seed.

The other type of floret, the disc, is easily noticed in all open centered flowers, and it is only when those full to the center of ray florets are fully opened, that they may also be seen there. These disc florets while having only rudimentary petals, are complete flowers with sexual organs capable of producing seed.

Fruitfulness in the Dahlia

By fruitfulness is meant the ability to produce seeds. Many plants are so constituted that they cannot produce seed with pollen from another flower on the same plant. This may be for the reason that the anthers ripen before the stigma is receptive, or vice versa. There is another form of failure to produce seeds that is known as self-incompatibility or self-unfruitfulness. In this form, the pollen is ripe at the same time as the stigma, but for some reason is not able to fertilize that stigma or any other stigma of the same variety. It is believed that it is to this class that the Dahlia generally belongs and that cross-fertilization must take place before any seed can be produced. For instance, the pollen of say Jersey's Beauty will not fertilize any stigma on any other plant of Jersey's Beauty, but pollen of a similar variety of say the same color is capable of fertilization. Of course, there may be some exceptions as every variety has not been scientifically tested, but research workers have determined that many varieties of Dahlias are self-sterile, yet will set seed to foreign pollen. However, I have said that there may be exceptions, and to be absolutely certain, trial should be made of every variety that it is proposed to breed.

Breeding the Ray Florets

To be absolutely sure of both parents, it is necessary to use control measure. This is tedious work, but interesting nevertheless.

In the case of the varieties which will set seeds in ray florets, the technique is to select the flower to be bred and cover it with a waterproof transparent bag just before the bloom opens. This bag is fastened loosely at the bottom around the stem by means of a wired tree label.

As soon as the rays develop, each day with a pair of manicure curved point scissors, clip off the showy part of the ray. The next day the pistils which are exposed, should be pollinated with pollen from the desired variety, which flower should have been covered before it shed its pollen to prevent contamination. This process is continued until the disc florets begin to shed pollen. At this time all of the disc florets should be pulled out by means of tweezers, thus preventing possible self-pollination.

The seeds are then allowed to ripen. If frost should threaten, the stalk should be cut and placed in clear water in a light, airy room. The water should be changed every day.

BREEDING THE DISC FLORETS

While it is believed that most varieties of Dahlias are self-unfruitful, it is necessary to emasculate in order to be absolutely sure; that is, to clear out all the pollen by some means.

When the disc floret opens, the pistil, which has two stigmas, first appears. The stigmas adhere together and as they protrude from the floret, they pass the anthers which shed pollen, coating the back of the stigma. After a few hours, the stigmas separate and curve outward, at which time the inner surface appears "hairy" and they are now capable of receiving pollen on the inner receptive surface.

It is practicably impossible to emasculate in the usual way, so a new method was worked out by the late George W. Oliver of the Bureau of Plant Industry, United States Department of Agriculture. This is known as the depollination method.

The flowers which are to be used as parents are covered as above. As soon as the center shows on the seed parent, all the ray florets are pulled out. When the pollen begins to shed is the time to begin the operation of depollination. By means of a chip blower such as dentists use, or some similar arrangement, a fine stream of water is directed with some force across the flower head in such a manner that it washes away the pollen. With a hand lens examine to see that no pollen grains are left. The excess moisture is then soaked up by means of blotting paper and the flower head covered again. Once a day, preferably in the morning, will do for this operation, but if it is very hot, twice a day would be more certain.

After depollinating for three days, the remaining disc florets which have not yet shed their pollen are extracted and the receptive stigmas remaining are pollinated by rubbing over them the open center of the pollen parent. This is easier than the more usual method of collecting the pollen on a watch crystal and applying it with a camel's hair brush.

The flower head is again covered and the seed allowed to ripen on the plant. As soon as the stem below the seed pod turns black and begins to shrivel, the seed pod may be dried off quickly and thoroughly and put into a paper bag until planting time.

Labeling

It is advisable to label in order to keep a record of the work done. A good type of label to use is the 4 inch painted tree label which is attached by a copper wire. On this is placed a record of the procedure. First record the name of the seed parent, as "Jersey's Beauty." Then give the dates of emasculation or depollination, as "E-9|2". When the cross is made the name of the pollen parent is indicated as "Jersey's Beauty X Jersey's Sunshine, 9|8". This label is left attached to the seed pod, and when the seed is sown, may still be used for a further guidance. It is interesting work, and if only a few seeds be obtained, you will be amply repaid by the enjoyment you get out of watching the plants grow and bloom.

Sowing the Seed

The seed may be sown any time after the first of March. If it is sown during March, the plants will be large enough to plant out about the first of May, if the weather be favorable.

Do not be in too great a hurry to get them planted out. One must of course be governed by the locality, because if there comes a late Spring frost, or even as low a temperature as 32 deg. they may get injured. While they will probably start again, they would thus suffer a severe check.

If seed is sown in March, this is, of course, usually done in a greenhouse. But it may also be started in a hotbed, or even in a sun parlor. I have also known enthusiastic amateurs to have good success from seed beds placed at a sunny window in the living room.

Later in the season seed may be sown in a coldframe, and when all danger of frost is over, it may be sown in the open ground like that of any other annual. But, of course, these later sown seeds will flower very late, if at all, and cannot be expected to show their true character the first year.

Any light, sandy soil may be used with a little humus or old leaf-soil added to help retain the moisture. The seeds may be sown quite thickly, as many of them will not germinate, not having the vitality; of course, they should not be so thick as to lie on top of one another.

Flats or seed pans are the best receptacles to use for this purpose. As the seeds are of good size, they should be covered with fine sifted soil or even sand to a depth of about ¼ inch. The soil should be kept moist, *but not too wet*, and shaded from the sun until germination starts. If the flat is kept in a temperature of from 60 to 65 deg. some seed will germinate in a week or so.

It will usually germinate very irregularly, so as soon as they are ready and show their first true leaves (the first pair are the cotyledons), the first seedlings should be transplanted into other flats, in which a little heavier and richer soil is used, the same as with Asters or any other annual.

Do not be impatient and throw away the flat or pan containing the seed until every one has had a chance to germinate. Many will not sprout for several weeks, and it is a curious fact that these late germinating seeds are usually the best varieties. The singles, which are more vigorous, nearly always germinate first.

HANDLING THE SEEDLINGS

Some growers pot their young seedlings singly into small pots, but I never do this. I always transplant into flats, finding that they make much better root systems in the flats. If they are planted out during a cloudy day, if the soil be dry, watered once at planting time, every one will grow.

If they are transplanted into flats about 4 inches apart each way, they will not become too crowded before planting out time.

After being transplanted the young plants should be kept growing along nicely in an even, moderate temperature. As soon as the weather is favorable, they may be removed to the coldframe. They should have plenty of air and sunshine at all times and should never be forced in any way.

As soon as the weather is favorable and the young plants are large enough, they should be planted out in their permanent quarters. A dull day should, if possible, be selected for this work, and the ground should be in a nice, moist condition. If the soil is very dry, it should be watered thoroughly a day or so before planting.

The sides or ends of the flat should be pried off and a flat trowel run under the whole mass of soil, when the young plants may easily be separated without much injury to their roots.

The seedlings may be planted in any spare piece of ground and as close as 2 feet apart in the rows if room enough is left between the rows to allow for good cultivation. As soon as the singles and undesirable ones begin to flower, they may be pulled out, allowing those that are going to be kept more room for development.

I always give my seedlings ordinary field culture, planting them far enough apart between the rows to allow the use of a horse or motor cultivator. I do not stake them, as I like to see what their habit will be without the use of stakes. After they begin to bloom, I stake all those that are going to be kept, numbering them in some convenient way and keeping a record of them in a book, with full descriptions. As each flower opens, other notes are made.

I have a system of marking that I find convenient. I number the seedlings as they bloom and, scoring them as I think they deserve, I give four x's (*xxxx*) for the highest merit, three x's (*xxx*) for second best and so on.

If a variety has flowered well throughout the season, and if, every time it flowered, it scored *xxxx*, then it is kept and the next year grown among the named varieties under the high cultivation that I give my exhibition flowers. Records are then made of it again.

All of the other seedlings are simply left in the ground to rot; in decaying they add more humus to the soil.

If a seedling does not show all the earmarks of being a good one the first year, there is no use bothering with it a second year, for it will rarely improve. Far better to try again from more carefully selected seed; and if you find that a certain variety does not produce good progeny, then try another variety.

Before a new seedling is introduced to the public, it should be tested in various parts of the country. The trial gardens, sponsored by the American Dahlia Society and by other societies, are of material benefit in the testing out of new varieties. If a variety does not do well in these trial gardens, then it should not be introduced at all.

Many raisers of new varieties have introduced new sorts that have never been certificated, or even tested at any trial garden. They hesitate to send them, thinking, perhaps, that they will not get a square deal, for nearly every grower is inclined to think that his geese are swans. The only way an unbiased opinion can be had on these new varieties, however, is to send them to the trial gardens.

Speaking from my own experience, I have always found the judgment rendered to be very impartial and just; in fact, my own varieties have usually been scored higher than I would have scored them myself.

I have had some varieties that did not score the required number of points to gain a certificate, and in every case my own note book has showed that these varieties had developed some undesirable trait, were not worthy, and were going to be discarded.

The American Dahlia Society and other societies devoted to the Dahlia are doing good work along this line, and ought to have the hearty cooperation of every grower. (See page 104.)

DETAILS OF DAHLIA CULTURE

Planting

TIME OF PLANTING. I am often asked what is the best time to plant. Of course, this will depend on the locality and the purpose for which the plants are to be grown.

If one only wants flowers for house or garden decoration, then planting may be done at any time, after all danger of frost is over.

In this section of New Jersey, which is on the Atlantic Coast, fifty miles from New York City, planting may be done about the first of May and continued until the first of July.

If really good flowers are wanted. such as are seen at the exhibitions, planting should not be done too early; the month of June I have found to be the best for this section, and the latter part of the month better than the early part.

If the grower is using green plants, then he must be governed somewhat by the condition of his plants. So it is unwise to be too arbitrary in setting any exact date for this important operation.

If the plants are fully ready by the first of June, and if keeping them longer would tend to harden them, far better to plant them and trust to pruning, etc., to regulate the plants rather than let them suffer in the pots.

I personally follow the practice of setting some out every week from the 15th of May until the 4th of July.

In our exhibition garden, where I use green plants entirely, I always govern my planting by the condition of my plants. I try to plant them out just when they are ready for a shift. I have planted some as late as the 8th of August and have secured good exhibition flowers, but as a general rule this very late planting is not advocated, as the late planted specimens may not make good mature roots for carrying over Winter.

Very early planted roots or plants, on the other hand, do not give fine, large flowers during the time they are most wanted (in September) as they are then past their best; also, due to the struggle they have had during the hot months of the Summer they are hard and somewhat played out.

A plant that is planted early in May will, as a rule, be fully grown by July when the very hot weather sets in. The plants then get hard, produce short stems and bunch up their foliage; plants in this condition cannot produce the best flowers.

The later planted plants will only be beginning to grow nicely when this hot weather comes; they do not suffer so much and can be kept growing along much better. As I have said before, a Dahlia needs to be kept growing all the time, and if we can keep the plants from standing still during the hot and usually dry months of July and early August, they will be ready to make fine plants when the cooler nights of late August and September come along.

As stated in a previous chapter, the ground should have been previously prepared by frequent working so as to promote a fine tilth and a high state of fertility. If it has been kept well cultivated, even if the weather has been dry, much of the soil moisture will have been conserved.

Distance Apart to Plant

For the best success Dahlias should be planted at least 4 by 4 feet apart—that is, if a piece of ground is to be entirely devoted to them. If a single row is to be planted, say through the middle of the garden and not too close to other plants, then they may be planted from 2½ to 3 feet in the row.

Working among the plants in September will show the necessity for this spacing, which seems unnecessarily great at planting time.

Staking

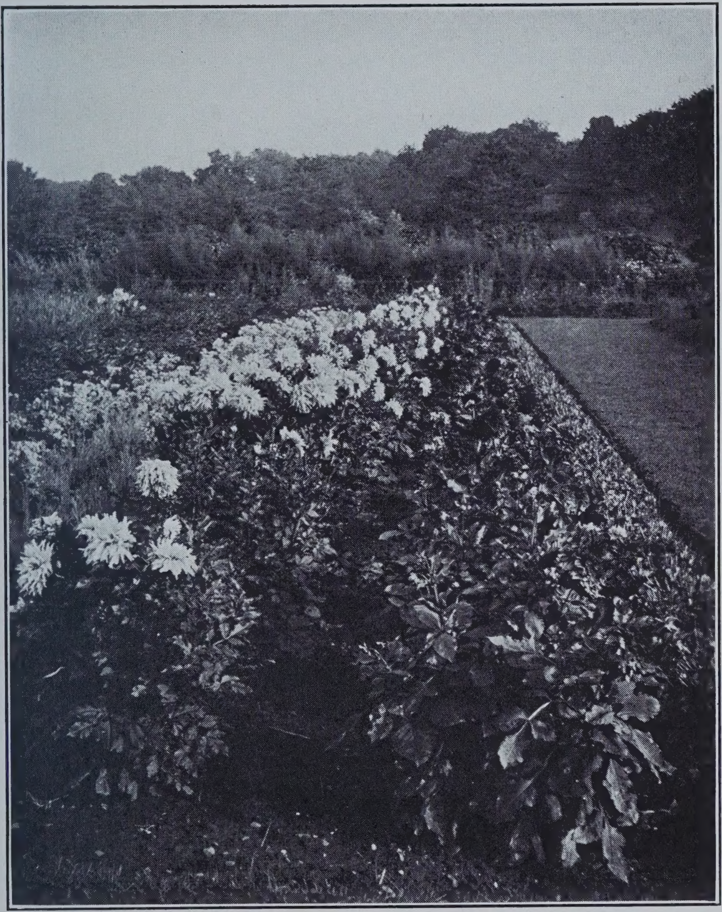
If stakes are going to be used—and they are necessary in the garden or if the plants are grown for exhibition—they should be set some time before the operation of planting begins; this is much more easily done when the ground is bare than if one waits until the plants need staking.

I have found a very good stake to be one made of Cypress, 1x1 inch dressed and cut in about 6-foot lengths. If cut at the local sawmill they will cost from eight to ten cents each. If they are stained or painted, not only will it add to their appearance but they will last much longer.

A small, double pointed tack should be driven in near the top of the stake, to which a wire label, bearing the name of the variety, can be attached.

The stakes should, of course, be pointed, and it is best to set them with the aid of a crowbar. If merely driven in with an axe or mallet, they may get damaged, which will lessen the period of their usefulness.

If a fair-sized plot is being used exclusively for Dahlias the stakes should be lined up both ways; this will greatly facilitate the use of the hand cultivator, for cultivation may then be done in all directions.



A ROW OF FRANCIS LOBDELL IN FULL BLOOM

This shows a desirable planting distance between rows; also strong, vigorous plants that do not demand stakes to support them.

The Actual Planting

In planting the roots, dig a good wide hole at least 6 inches deep. Lay the root on its side, with the eye or bud pointing upward and with the crown close to the stake, but not touching it. Then cover the root carefully with soil, gently firming it down.

It is better not to fill up the hole entirely at first. The root will start quicker if it is only half filled; the after cultivation will gradually fill up the hole as the shoot grows.

If the roots seem very dry, and somewhat shriveled at time of planting, they should be soaked in a pail of water for a short time, when they will absorb some moisture.

In planting green plants the same methods are carried out, stakes being set first, etc. The hole should be at least 6 inches deep, and wider than the size of the pot in which the plant has been growing to allow the proper firming of the soil around the ball of roots. The ball should be dipped in a pail of water if not already in a moist condition.

In planting young plants, they should be set deep enough so that at least the first joint above the pot will be below the leveled surface of the soil.

Here will be seen the advisability of having a short-jointed, stocky plant, in which case the ball of soil is all that needs to be buried at time of planting, the hole being gradually filled up as the plant grows.

If the plants are small (and small plants are better than large ones, provided they are well enough rooted), and if the hole is filled up entirely at planting time, the young roots may be buried too deep; some of them may die for want of air, and cause the plant a severe check.

Some growers plant shallow and afterwards hill up to the plants. This is not good practice except on very wet soils, for most of the water will be shed from the roots of a hilled-up plant.

A wet, or at least a cloudy, day should, if possible, be selected for planting green plants. I invariably do my planting in the evenings, and usually I have to wear a rain coat.

If not planted during a wet day, the young plants should be watered at the time they are set. After the ball of roots has been carefully covered and the soil firmed, the hole may be filled up with water; this will settle the soil around the roots very efficiently, and will provide enough moisture to carry the plants for several days.

If the plants have been grown at home and well hardened off in the open air, they will not require shading, but if they have been shipped from a distance, and have been packed in a box for a few days, then they should be shaded.

I find a good way to shade these plants is by the use of leafy twigs set around them; these do not exclude the air and for the first few days the leaves on the twigs give all the shade necessary. Then, as they shrivel, they allow more sunshine each day until the plant is able to stand the full sunshine, when the twigs may be removed.

I have frequently set out plants direct from the cutting bed into the open ground; given this sort of shading, every one has taken hold.

Cultivation after Planting

As soon as the roots or plants are planted, the stirring and cultivation of the soil must begin, and it must be the watchword from now on. At least twice a week, and as soon after every rain as one can get on the soil, the surface should be broken up and stirred. This permits the admission of air to the soil, which is necessary if the soil bacteria are to function. It will also conserve the moisture in the soil.

A little three-pronged hand cultivator is a very useful tool for working around the plants; with it one can do several hundred plants in the course of an hour.

For cultivation between the rows, if the plot will permit, a wheel hoe will be found very useful. But no matter what tools are used, the ground should be kept well stirred; in a dry spell the oftener this is done, the better. Deep cultivation should be practiced until it is noticed that the roots are coming to the surface; then only a very shallow cultivation around the plants should be given; in fact, at this stage a good method is to mulch the plants.

Pruning and Disbudding

If Dahlias are allowed to grow at will, they will become very bushy and soon come to maturity and harden up; only poor stems and inferior flowers will be the result.

To get the best flowers, disbudding and pruning are resorted to. The regulation of the number of the branches (which is here called *pruning*) is of more importance than *disbudding*, which is just the removal of unnecessary flower buds.

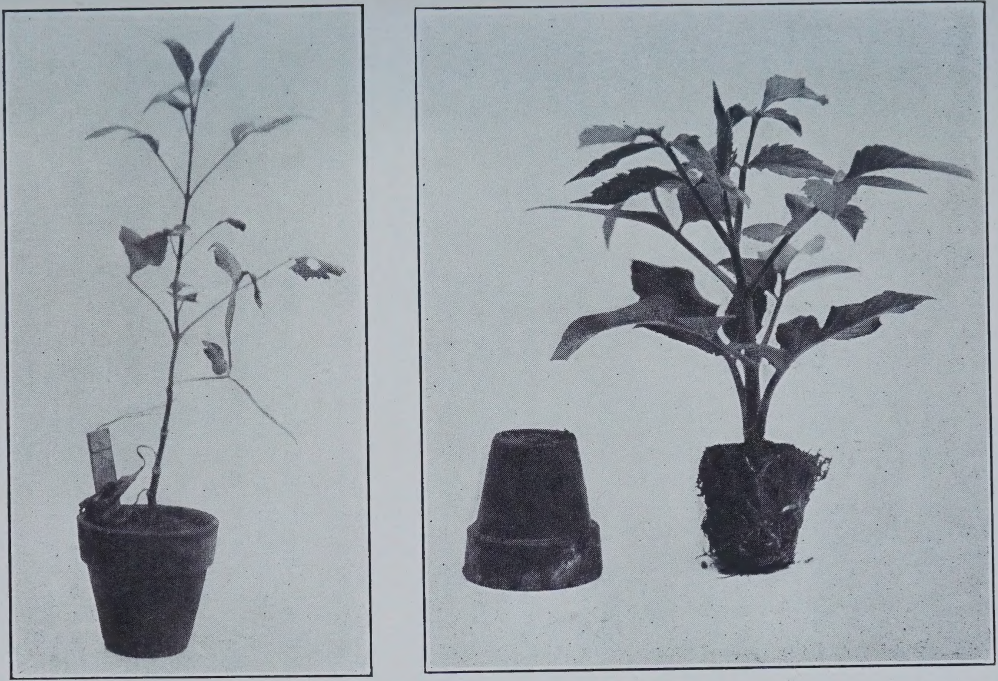
First we will discuss the shoot from the time it appears above ground. Only one good shoot should be allowed to develop, all others being removed as soon as one is able to determine which one to keep.

If green plants are used there will always be only the one main shoot to contend with from the beginning.

When Dahlias are grown without stakes the plants are usually pinched back when about a foot high in order to make them branch and to make them more able to support themselves.

THE DECORATIVE BEAUTY OF THE DAHLIA INDOORS

A vase of Francis Lobdell, a well known variety and a favorite with many. It is one of the most profuse bloomers.



A POOR YOUNG PLANT—AND A GOOD ONE

The former *(left)* will never make a good specimen; it has been grown too warm and too close to other plants. It is weak and spindly and already its lower leaves are falling. The good plant *(right)* is stocky, vigorous, and has short joints and a fine root system; it is in just the right condition to plant out.

Dahlias planted in May or early in June will usually begin to show a center bud about the end of July or the beginning of August. This is too early to allow the flowers to develop, for Dahlias are Fall flowers and their color and formation are not at their best during the hot Summer. Neither will the flowers keep well at this time. So as soon as this first bud shows, it should be disbudded or pinched out.

Directly below the center or crown bud, in the axils of the leaves, other young shoots will be seen developing. The first two pair of these shoots below the crown bud should also be pinched out, as they likewise would soon develop flower buds which would be on short stems.

By the removal of these shoots, the growth and strength are directed to the lower shoots, which soon begin to develop and which will produce longer stems before developing flower buds. These are known as the *laterals*, and from four to six of them are enough to leave at this time; all others should be pinched out.

The pinching out of the crown bud and the two pairs of shoots directly below it is better than the cutting off of the main stem down to the point where the lateral branches start, for if the main stem is cut a lot of healthy foliage is unnecessarily sacrificed and the plant suffers a severe check to its whole system. Also, as the stems thicken, the opening where the cut was made would become quite large; as the stems are hollow, water would collect in the stump and, combining with the juices of the plant, would soon ferment in the hot weather. Decay would then set in, much to the distress of the plant.

If the main stem is left it can be tied to the stake for support; moreover, the point where it is cut is quite small and therefore does not collect any water

When the lateral shoots develop flower buds, it will be noticed that at every pair of leaves other primitive shoots are beginning to develop. These side shoots should be pinched out as soon as they can be handled between the forefinger and thumb, allowing only the last pair at the base of each lateral stem to remain. When the flower is removed the stem should be cut down to these lower buds (which may be called the *sublaterals*) when they also will soon develop long stems with flower buds.

The total number of shoots allowed to develop must be governed by the condition of the plant; the later and weaker it is, the fewer the branches that should be allowed to develop.

After the end of September, everything may be allowed to grow naturally; this will assist in the maturing of the roots.

Throughout August and the early part of September, a careful thinning out of all superflous branches should be done; also all old leaves should be removed, especially from the center of the plant, to allow a free circulation of air.

The lateral branches as they lengthen should be kept tied up loosely to the stake. They should always be slung up individually and should never be tied tightly or bunched together.

DISBUDDING OF THE FLOWER BUDS

As the Dahlia always develops its flowers in sprays of at least three flowers, all flower buds except the center one on each stem should be removed as soon as noticed.

The buds at this time develop very quickly and a grower must go through his plants very frequently. If this disbudding is done often and while the buds and shoots are merely developing, there will be no check to the plant, and the grower will be amply repaid with larger, better flowers on finer stems.

On late planted plants, the center bud on the main stem may be allowed to develop into a flower which is usually a fine large one.

As the first two or three blooms on a plant are usually the best, the grower of exhibition blooms regulates and times his plants so that he will get a maximum of these fine flowers at the time he most wants them.

No exact data can be given as to how long it takes a flower to develop, from its appearance as a tiny lateral shoot until it is open, as this depends greatly on the variety and the season.

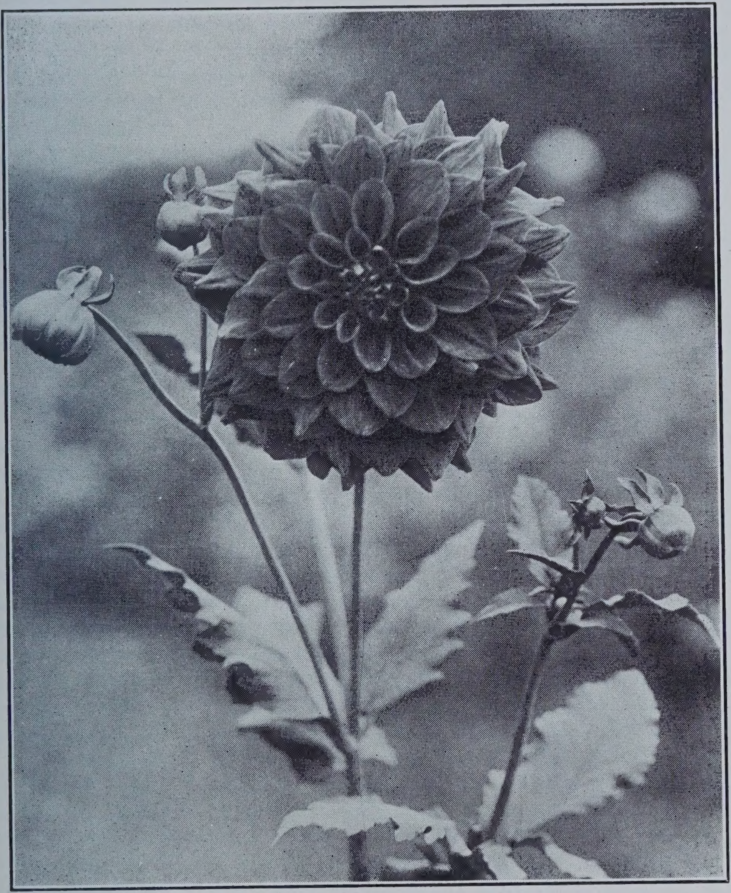
As a general rule, lateral shoots beginning to develop about the middle of August will be in bloom from the middle of September on.

Early planted plants require much more care and attention, if they are to produce good flowers for the shows, than do those that have been planted later; they are inclined to be tall and very high plants are to be avoided if possible, for they are too easily broken down by the winds. However, if the above methods are used in training and the top sets of shoots are consistently pinched out, the plants will be kept neater and lower. It should always be borne in mind that the lower down the lateral branches are induced to develop, the longer will be the flower stems.

Watering and Mulching

During the growing season Dahlias require a large amount of water. When they are small they of course do not require so much, and but little artificial watering will be needed until the plants are fairly well developed—save during periods of severe drought.

The composition of the plant is over 90 per cent moisture and as all this water must be taken in from the soil, it is often necessary in



A TYPICAL "UNDISBUDDED" FLOWER

It is smaller and shorter stemmed than a disbudded specimen, and it is accompanied by a number of buds that are getting some of the strength it might otherwise have received. But it is certainly graceful for indoor decoration work. The variety is Jersey's King.

certain sections to resort to artificial watering. The transpiration from the leaves of a well developed plant is very great, as is also the evaporation of moisture from the leaves and from the surface of the soil.

Constant cultivation will tend to conserve the moisture in the soil, but in plants grown for exhibition, and for best results generally, it will be found advisable to supply a certain amount of water by artificial means.

If plants continually wilt during the day, it shows that the transpiration and evaporation are in excess of the absorption, and that water must be applied to keep the balance more even. Also, plants suffering from want of water soon get hard and stunted striving to protect themselves against the loss of moisture; of course, in this condition they cannot produce the best flowers.

A system of overhead irrigation is cheapest and best where the size of the plot will warrant it. For the satisfactory working of an overhead system, the water pressure should be from 35 to 40 pounds; with this pressure the lines may be installed 50 feet apart.

Even if watering at the roots is not absolutely necessary, the plants will benefit greatly if these sprinklers are turned on for a short time in the evening after a hot day so as to spray the leaves. The plants can thus be kept soft and in the vigorous growing condition which is the delight of a good gardener. Some people say that watering should only be done at night and never in sunshine. From a practical point of view this is not the case; watering may be done at any time, even in full sunshine, without any bad effects. Of course, some water will be lost by evaporation if overhead watering be done in sunshine, but this loss is negligible and to allow the sprinklers to work during a very hot day will assist the plants greatly by reducing evaporation and lowering the temperature. Whenever watering is resorted to, by whatever method it is done, a good, thorough soaking should be given to the soil.

While I advocate the overhead method of watering for plants during the growing season, some judgment must be used, especially in watering when the plants are in bloom. They require just as much water at this stage, and if they *are* kept well watered the flowers will be larger, the color better, and the centers also (especially in those varieties that are inclined to have hard centers); but if overhead watering is done at this stage many flowers may get broken off at the necks, so it is often better to allow the hose to furnish the water at the roots at this time.

Mulching. When artificial watering cannot be resorted to and when it is desired to reduce the need of water to the minimum, great benefit may be had from mulching. This consists of applying around the roots of the plants—or, in fact, over the surface of the whole bed—a coating of rotted manure; or if manure cannot be had, meadow grass.

If manure be used, some benefit will, of course, be derived from its feeding value as well as the protection it affords. Fresh stable manure rich in ammonia should never be used as it will injure the foliage.

Short meadow hay or even straw may be used with good effect, but, of course, its benefit is restricted to the protection of the roots against excessive evaporation.

No mulch should be put on until it is necessary to stop cultivation; this is usually about the beginning of August when the young feeding roots of the plants are close to the surface of the soil. A mulch at this time will keep these roots cool and also protect them.

At this stage, just before the mulch is applied, if it is thought that the plants need a little more food, a light application of special Dahlia food should be made; or very fine bone flour could be used. For ordinary soils, 50 pounds to 1000 square feet should be enough. I also recommend at this time an application of Scotch soot, about the same quantity as recommended for the other fertilizer (50 pounds to 1000 square feet). This Scotch soot, which is richer in carbon and sulphur than the soot produced here (as it is made from a different coal), will be found to aid materially in giving a darker green to the leaves and a more vivid color to the flowers.

It should be noted that it is not wise to give the white or lavender varieties soot as it will not improve and may slightly spoil their color.

Controlling Insect Pests

The Dahlia at present has no serious disease or pest to contend with. It is true that there are certain pests which prey on the Dahlia but these vary in different sections, and there is no one pest that is really epidemic.

Cutworms usually cause the grower a little worry, but they are no worse on the Dahlia than on many other plants; in fact, if the Dahlia is not planted out until June, or is not above ground until that time, most of the cutworms will, in an ordinary season, have pupated and completed their ravages for the Summer. In sections where they are very bad, it is wise to take some precautions against them, especially if you are using young plants. If a shoot from a root is cut off by a cutworm, it will soon sprout again, but if a young plant is cut off, it may come away again, but it suffers such a severe check that it never seems to recover completely.

So where expensive new plants are being used and where there are cutworms, it is best to protect them. This is best done by making little cardboard or tin collars to go around each plant. They should be put in place as soon as the plants are set out, for the cutworm will usually attack them the first night; and it usually picks out the most valuable first.

A mixture of paris green and bran, laid down as a poisoned bait, will very often get rid of a lot of the worms.

White Grubs. In some sections the large white grub, which is the larva of the May or June beetle and which does so much damage to lawns and golf courses, is very bad. He is a voracious feeder and lives for several years, eating roots of all kinds of plants. There are certain varieties of Dahlia that he is very fond of and often, when a plant is not doing well and the stock is being blamed for being unhealthy, etc., if the roots are examined it will be found that they are being constantly nibbled by this pernicious grub. If it is very troublesome, the ground should be treated before planting time with a weak solution of cyanide of soda, one ounce to 25 gallons of water.

Clean cultivation, spading up the soil in the Fall so as to leave it rough all Winter, and allowing the birds to get at the grubs will do much to keep them down. They are usually much more troublesome in a soil that has been newly broken up after a period in sod, so such a soil must be carefully watched.

Stem Borers. Fortunately we have not got the European borer in this section, but we have the stem borer which is more general and which at times gives serious trouble. I do not know of any real remedy for this pest. We do not even know he is present until most of the damage is done. The best thing to do is to watch the plants very carefully, and whenever there is any signs of his working, dig him out and put an end to him. The plant usually recovers, and as the borer is at its worst for only about a month, it can be controlled. Its presence is indicated by the wilting of a portion of the plant it has been working on. As soon as a plant shows this condition, a vigorous search should be made; the borer will usually be found boring his way either up or down in the stem. A portion of the stem should then be cut away until the insect is found. If the plant is in a serious condition, special care should then be given it for a time in the way of watering, etc., until it recovers. This pest is found in other herbaceous stems besides those of the Dahlia, and much can be done to keep it down by clean cultivation of all surroundings. All weeds and plants with hollow stems should be cut down in the Fall and destroyed by burning, when a lot of eggs of various injurious insects will be destroyed.

Aphis, or Green Fly. The green fly or aphis is sometimes troublesome, especially when the plants are young, but this pest is so easy to control that there should be no excuse for it. Any contact spray or a dusting with a tobacco powder will soon eliminate it.

Red Spider. This pest is usually more troublesome in dry weather; it can be got rid of by spraying with a nicotine and soap preparation.

Thrips (*Frankliniella Tritici*) (*Fitch*). It is my candid opinion that the worst insect we have to contend with, and the one that first causes the stunted condition of the Dahlia, is thrips. This is a minute insect, hardly to be seen with the naked eye, and can never be detected unless looked for, as it works in the folded bud of the growing point of the shoot. In warm weather the eggs of this insect hatch out in about ten days. The very tiny white larvae feed in colonies for a period of from ten to twenty days, doing a great deal of damage by sucking the juice out of the young, undeveloped leaves and the tender growing point. These larvae then enter a pupal stage, which lasts only about six days, when the adults emerge, also doing a lot of damage by sucking the juices and immediately starting a new generation. This insect, so very minute and completing its life history in such a short time, is really a more serious pest than anyone would imagine from its size. It usually appears about the end of June, sometimes earlier if the weather has been warm, so that all through the warm months of the year it can have a great number of broods. As this insect is a sucking insect, it is controlled by a contact spray or by asphyxiation. It works in the folded leaves of the growing point, and is therefore somewhat difficult to control by a spray, for unless the spraying is done repeatedly and effectively, the insects will escape.

Any nicotine spray will control thrips and the best proportions to use are one part of 40 per cent nicotine sulphate, diluted with 800 parts of water; one ounce of fish oil soap should be added to each gallon of the solution. Spraying should always be done in the hottest part of the day as the gas given off from the nicotine will tend to kill by asphyxiation. A nicotine dust is also used by many with good effect and this dust should as well be applied in the hottest part of the day and when the sun is shining. As this pernicious little insect sucks the juices out of the young leaves and tender growing point, it sets up an irritation and when the leaves develop they show the effects of this irritation by being a paler color. The leaves have been popularly called the lungs of the plant, but they are more than mere lungs; they are the workshops in which the food is manufactured for the nutrition of the plant. Certain elements are taken in from the atmosphere by the

JANE COWL

A superb informal decorative Dahlia held aloft on rigid stems. In color it is a warm buff and old gold, blending to a bright salmon at the center.

leaves, and in the leaves these elements are combined with the elements taken in by the roots, thus converting the whole into food.

Therefore a certain balance is necessary between the leaves and the root. If the leaves become injured in any way, the proper balance is upset and the plant does not get its proper nourishment; thus, injury to the leaves by insects, if allowed to continue will cause damage to the very roots of the plant and the entire plant gets into a sickly condition.

The very smallness of the thrips makes this a serious pest to the grower, especially the amateur, because the insects are not seen unless looked for, and the first indication of their presence is noted when the plant begins to stunt. Then, not only must the insects be gotten rid of, but the plant must be coaxed back into normal condition,which usually takes some time. If continual spraying or dusting is done as soon as the plants are set out, or as soon as the shoots are above ground if roots have been used, the insects can be kept in check. By spraying I do not mean just spraying the plants and then forgetting all about them until they become affected again. To properly control any insect a regular schedule of spraying or dusting should be evolved; the old adage that prevention is better than cure is well exemplified in the control of all insects. I spray or dust twice a week during the latter part of June and July. By that time the plants have usually gotten such a good hold that they can better withstand the attacks of any insects. It is when the plants are young and before they have a good root system of their own that insects do the most damage.

LEAF HOPPER (*Empoasca Mali*). The leaf hopper is another insect that helps to bring about a stunted condition of the plants. It might be said that thrips start it and the hopper finishes it. I do not think this insect is as serious as the thrips, for the reason that it can be seen readily, and when an insect is visible, one usually takes steps to control it. There are two stages of this insect, the nymph and the adult, in which it lives by sucking the juices. It is greenish in color and usually appears about the beginning of July, always attacking the weakest plants. It is usually found running along the underside of the leaf, but does not get into the folded growing point like the thrips, so can be more easily reached with a contact spray. The same spray or dust used for control of thrips will keep this insect in check, but it is difficult to get a 100 per cent kill as it will hop right in front of the spray. I have found the nicotine dust a better control of this insect than a spray, providing a good cloud of dust is blown about the plants during the hottest part of the day. After dusting the plants should again be sprayed in the evening with clear water, as too much dust may close up the stomata or breathing pores of the plants. I would urge all those who have had this trouble with the Dahlia—and I do not know of any who have been free from it—not to become discouraged and not to blame the stock or those from whom it was purchased. There is no unpreventable or incurable disease among Dahlias; we as gardeners have to meet the same conditions with all the plants we grow. Every plant has its natural enemies, and as these plants are more widely and intensively cultivated, so also do their natural enemies become more numerous. Therefore, the gardener must be ever on the alert to keep the enemies of the various plants down to a minimum in order that he may have healthy and productive stock.

Controlling Dahlia Diseases

MILDEW is a fungoid disease that in some sections troubles the Dahlia grower. The beginner is usually more troubled by it than the more experienced gardener, for he knows at once how to keep it under control. It is a curious fact that the mildew attacks only the older leaves of the Dahlia, while on most plants it is the young and tender parts that are affected. For this reason it is not a very serious disease. All old leaves should be picked off to allow a better circulation of air, for it is the stagnant air around the roots of the plant that is so conducive to its growth. In addition, a dusting of grape dust or flowers of sulphur will keep the trouble in check.

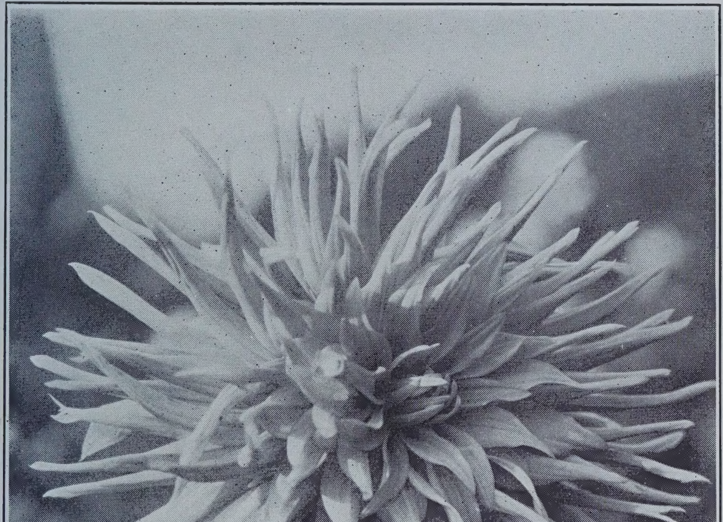
STUNTED CONDITION OF PLANTS. The so-called stunt disease is, in my opinion more often caused by various conditions than by a disease. Stunted plants may, for instance, be caused by improper planting—too deep planting I have found to cause it; and so will the use of dried up, wizened roots. A plant that is getting stunted will usually show the condition quite early in the season, and it should then be dug up at once and thrown away. There is no use in wasting time over it; far better throw it away and put another in its place.

I have frequently seen a good healthy plant suddenly stop growing and go into this condition and, on examining the roots, have found that a mole had burrowed under it, thus cutting off its supply of moisture and allowing the root to dry out. I have also found the larva of the June bug (the white grub) eating the roots and causing this condition.

If a root is allowed to sprout too many shoots, they may all become stunted, using up all the stored food material before they can make roots.

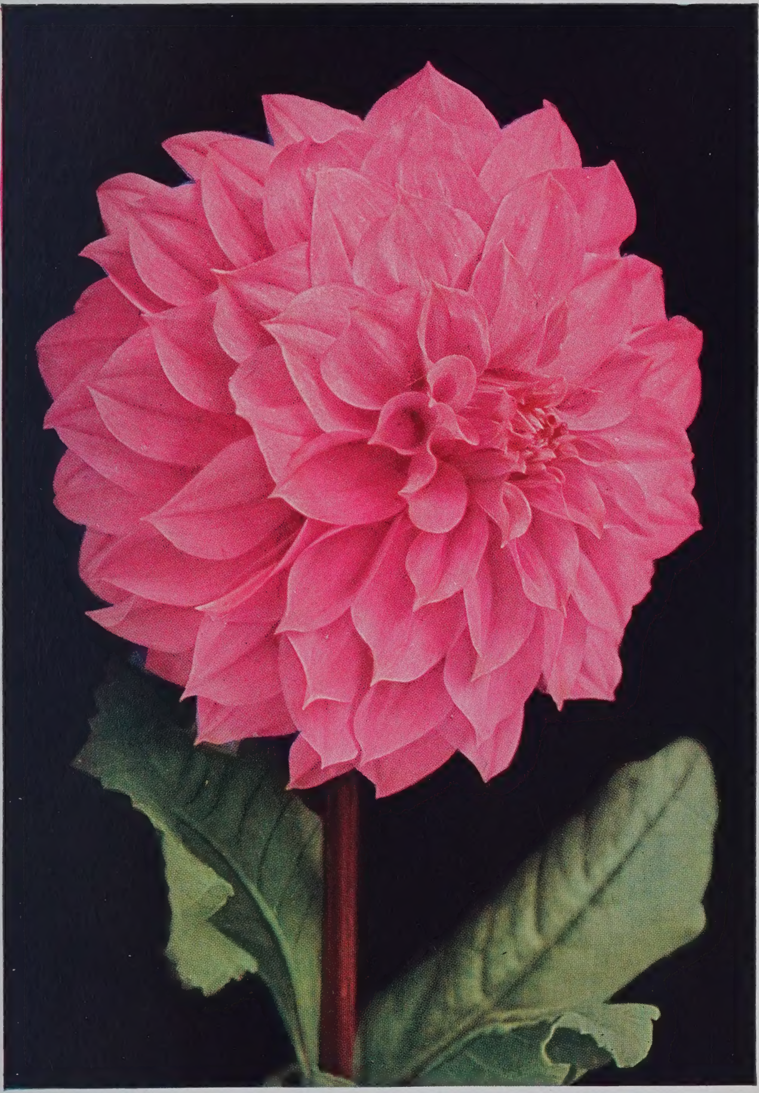
A check at the time of planting such as might result from a lack of water causing some of the roots to die, will also create this condition.

While the stunted condition may be more noticeable in the Dahlia



THE FAMOUS AMERICAN CACTUS VARIETY, AMBASSADOR

A typical bloom of a typical representative of the Cactus type—in color, soft yellow buff, shaded salmon pink.



A SINGLE BLOOM OF JERSEY'S BEAUTY

A typical modern Decorative. Introduced by the author in 1923 and winner that year of the American Dahlia Society gold medal.

(Reproduced by courtesy of John Scheepers, Inc.)

and therefore be classed by some as a disease, yet this same condition may be seen in nearly all cultivated plants.

We can, by accident and improper culture produce stunted plants among our Chrysanthemums, Carnations, Lettuce, the humble Cabbage, or almost any other plant we grow. Yet if one encounters this condition among his Dahlias, he blames the variety or quality of the stock at once, forgetting to analyze first his own methods of culture.

It is no doubt true that the disease known as mosaic will cause stunted plants, but I firmly believe that many plants are stunted through other causes, and afterward become the prey of all kinds of insects and diseases.

It is a notable fact that where roots are planted exclusively, the percentage of these stunted plants is much higher than where good, healthy plants are used.

By the use of healthy young plants propagated from selected stock, I have in my own plantings reduced this condition to the minimum, seldom having as much as one per cent of my plants show it. But where roots have been used I have seen as high as 50 per cent stunted.

I have talked with many prominent growers the past season. and they all agree with me that this stunted condition of the plants is a serious menace to the Dahlia industry. Many growers, as soon as you mention the stunt to them, immediately say that it is the result of overfeeding in order to produce exhibition blooms, and let it go at that; most of them say that it is the result of feeding with nitrate of soda, the plants becoming weakened and getting stunted the following season. I wonder how many of these growers making this statement ever took the trouble to experiment to see if they could not find another reason for the cause.

I have never used nitrate of soda on my Dahlias, nor do I know any grower who does. I grow exhibition Dahlias and know many other growers who grow for exhibition, yet it is a notable fact that you will see less evidence of this stunted condition in the gardens of these exhibition growers than you will find in the gardens of those who do not grow for exhibition and who claim that they do not feed; therefore, we should look for some other cause than this old bugaboo of overfeeding and overpropagation.

I have given this stunted growth of the Dahlia a very close, and, as far as I am able, comprehensive study, and I am convinced that about 90 per cent of the trouble is caused by the attacks of insects and the other 10 per cent caused by faulty root action contributed by other causes. Some people claim that it is caused by a disease, and that the disease is carried by the insects from an infected plant to healthy plants, and they have shown me spots on the roots which they claim are caused by the disease, when as a matter of fact, the spots are nothing more than lenticels and may be seen on many parts of the plant. I have yet to be convinced by scientific research that there is a disease that causes this condition without the aid of insects. I claim that if there were such a disease, the disease would eventually kill the plant, but we all know that as soon as the cool nights come, these stunted plants do somewhat recover, simply because the ravages of the insects are lessened. I have proven many times that stunted plants can be cured, not by the aid of any fungicide, which would be necessary if it were a fungoid disease, but by the use of insecticides. As I have previously stated, these stunted plants begin to recover with the cooler weather, when the insects are no longer troublesome, and will sometimes even produce flowers should the frost hold off long enough. Of course, these retarded plants, which only begin to grow late in the Fall, do not make good roots, if any, and while it has been proven conclusively by actual experiment that they can be saved and produce perfectly normal plants the following year, yet it is not advisable to try and keep them. Some varieties are more subject to this condition than others. Usually those with the thin, paler leaves are the worst sufferers.

One of the first steps to be taken in securing more healthy Dahlias is by a proper selection of varieties, because it is a well-known fact that, while some varieties are very susceptible, others are practically immune. This is a fact to which the hybridist has not paid enough attention. If the producer of new varieties would work along scientific lines, trying to produce more resistant varieties and not introducing any variety, no matter how beautiful, if it is inclined to stunt, a great step in the right direction would be gained. This has been accomplished with great success with other plants, notably the Potato.

If all those who issue catalogs, in addition to repeating the glowing descriptions as given by the raiser, would impart a few facts regarding the habit of the variety as they had found it by their own experience, it would prove of great assistance to the amateur, because it is a well-known fact that certain varieties will be more subject to the stunted condition in certain localities. A catalog would then be something more than a mere means of getting orders; it would prove a real guide in selecting the proper varieties.

For detailed information on further causes of stunted condition of plants as brought about by thrips and leaf hopper, see pages 74 and 77.

Cutting the Flowers

The early morning is the best time to cut the flowers, before the dew is off them and before the sun's rays have had a chance to evaporate any of the moisture from the foliage and stems.

Cut the stems as long as possible even if long-stemmed flowers are not wanted. This will keep the plant down, and longer stems in future will be the result. Most amateurs and inexperienced growers cut their flowers too young; they do not allow them to develop fully, then wonder why their blooms are not as large as those of the professional.

Flowers should be allowed to just reach their maturity before being cut; they will then be larger and will also keep better if wanted as cut flowers for decoration purposes.

Whether the flowers are being used or not they should never be allowed to fade on the plant, except where wanted for seed. As soon as they begin to fade they should be cut with long stems. Every time a flower is cut the act should be looked upon as a sort of pruning; the plants are thus kept much neater and within bounds, and the next flowers will be better and have longer stems than they would have had if the previous flowers had been cut with short stems.

If flowers are wanted to be shipped to a distance, or for an exhibition, they should always be cut the morning before they are wanted. The lower leaves should be stripped, and the stems put at once into cold water, the container being placed in a cool, dark place for a few hours before they are used. Then they begin to draw up water into the stems, and there is no evaporation.

Sometimes wilted flowers can be revived by placing the cut ends of the stems into very hot water for a few minutes, then back into cold water, and then placing the blooms in a cool dark place. However, these revived flowers are not recommended for shipping purposes.

When the flowers have been out of water for a time, a small portion of the stem should always be cut off before they are put back into water. The pores seem to heal over and callus so quickly that this is necessary in order that the water can be absorbed more readily.

Lifting and Storing the Roots

To the real lover of the Dahlia who has been enjoying the wonderful flowers throughout the Fall months, this is a sad time; the first frost is always looked upon as a bitter foe.

I have had Dahlia growers more than one hundred miles away call me up and tell me of their loss. I know one enthusiast who covered his whole plot—and it was no small one—with canvas, at considerable expense, to keep his flowers a few days longer.

Yet no matter how sad we are, we must get to work and by taking proper care of the roots, prepare for another year. Possibly if we had Dahlias all the year round, we would not appreciate them so much.

The time of the first frost varies in different sections. We usually do not get it here until from the fifteenth of October to the first of November. After the latter date, even if there should be no frost, the Dahlias are on the wane. They do not seem to like the shorter days and as October advances they gradually get smaller and smaller.

If the frost does not occur in October it is wise to start digging anyway about the first of November.* For if the frost has missed you until that time, when it does come it may be so severe as to cause serious damage to the roots. Anyway, there is not much gained by leaving them in the ground after that date.

As soon as the plant has completed its full growth, it begins storing up material in its roots for future use.

The plant should be cut down just prior to digging; a pair of long-handled lopping shears will be found very suitable for this work.

The roots should be dug very carefully; this should be done with a spading fork, for if a spade is used many of the roots will be cut. Large clumps are best handled by two men, who should dig carefully around each clump, at a distance from the stalk where the points of the roots are. The forks should be kept parallel with the radiating roots. After the soil is taken out, the men should put their forks down, one on each side and directed under the clump, and gently raise it out of the hole.

It should *never* be pulled up by the stalk, as the roots may thus be strained; but after it is thoroughly loosened, it may be lifted by the stalk. The clump should then be turned upside down on the edge of the hole to allow all the moisture to drain out of the stems.

On light soils very little soil will stay on the clump, but on heavy soils some will stay on, and it is well to let all stay on that will. It will prevent the necks from injury during subsequent handling, and most of it will dry and fall off before the clumps are finally laid away.

The clumps should be allowed to dry out for a few hours if they are wet, but if they are dug during a drought they may be taken inside at once. As soon as dry they should at once be put under cover, in a cool place where there is no danger of frost. When all are dug, they should be put into permanent storage quarters.

If it is a miscellaneous collection, they should be all plainly labeled; this is best done by using the wired labels and putting the wire around the neck of one of the larger roots.

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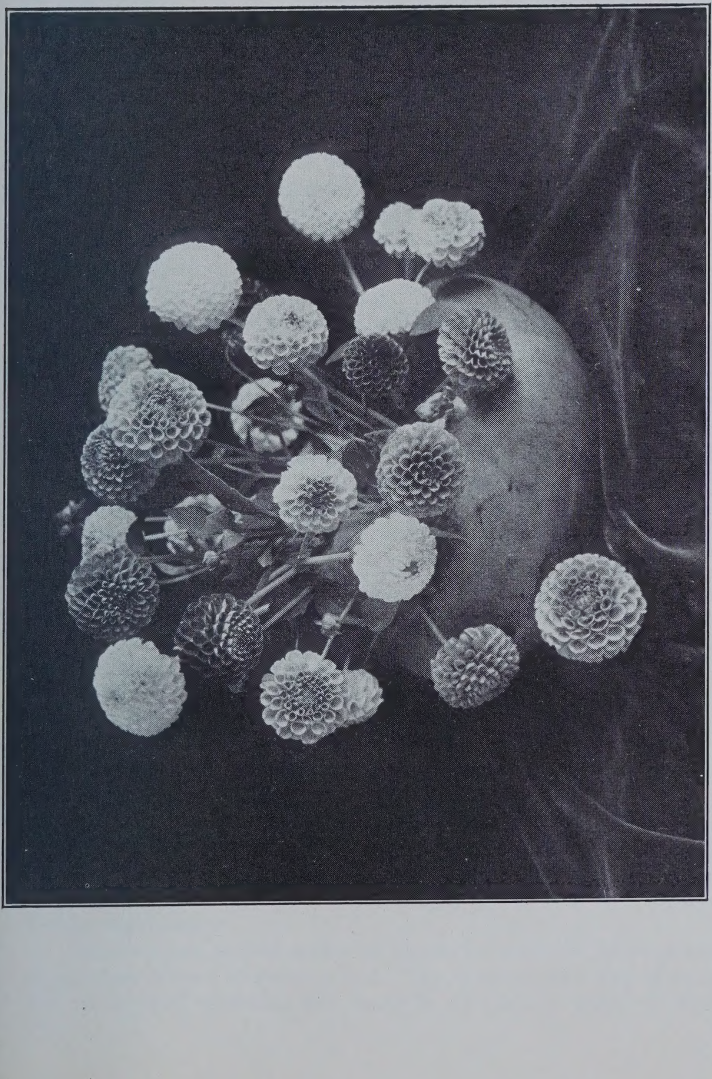
*Note.—These dates are given for this (northeastern) section of New Jersey. Growers in other sections must be governed by their own conditions.



POMPON OR BOUQUET DAHLIAS
much in favor as they are so well suited for all kinds of decorative work.

If the label is placed on the stem, the latter will shrink when dried out, and in handling the label will fall off.

There is always much comment among Dahlia growers as to the best methods of storage. Large grower have special storage quarters, but the amateur and small grower have to do the best they can with what facilities they have.

Some have good success by putting the clumps into barrels and boxes lined and covered with newspaper; these must be kept in a frost-proof place, but should not be where it is too warm and airy or many of the roots will shrivel as a result of the moisture being evaporated.

I have had good success keeping them in bins in a storage house (which is kept at about 40 deg.) and covering the roots with dry soil.

I do not put the roots upside down as recommended by most writers, for I believe this damages a lot of roots. I try to get rid of all excess moisture before storing my stock.

No matter where they are stored, they should be looked at from time to time throughout the Winter, to see how they are faring. If the conditions are too dry some moisture may be added; if they are getting mouldy (showing that there is too much moisture) they should be moved to a dryer place.

I believe that there are certain sections of the country where they may be kept in the ground throughout the year. In those places these notes can be of no benefit; but we, in this latitude, cannot do so, and must be guided by our own experience and by the methods we have to adopt.

There will always be some degree of loss so long as we have to adopt this artificial means of storing, and the grower who has made previous mistakes will take care that these same mistakes are not made again. Experience is the great teacher, and as for those who have won success keeping the roots their own way, I would advise them to stick to that method.

Packing and Shipping Dormant Roots and Green Plants

The dormant roots of the Dahlia are easily shipped from one part of the country to another; in fact, the ease with which this may be done has no doubt made this the most popular way of treating the Dahlia in commerce.

Before being packed each root should be very carefully examined, to see that it has a live eye or bud. The most popular way of packing the roots—and probably the best—is to place a piece of slightly dampened moss over the crown, wrap the root in wax paper, and pack it snugly in some material such as buckwheat chaff, cork sawdust, etc.

Packing Roots. The roots should be packed in strong boxes, and packed firmly, as sometimes a jar will break a root in two.

Shipment is usually made in April or May after all danger of freezing is over, but sometimes roots are in demand earlier than this for propagating purposes. If a shipment is made during cold weather, the box must be large enough to contain sufficent insulating material at its sides and ends to prevent the freezing of the roots.

A very good way to handle valuable roots is to pack them securely in a small box, then pack this smaller box in a larger box, placing it in the center, and filling all around it tightly with sawdust which is an excellent insulating material. If packed carefully in this manner they will go through safely though the temperature is many degrees below zero.

On receiving a shipment of roots, one should unpack them at once and place them in congenial quarters.

Packing and Shipping Green Plants. With our wider knowledge of the culture of the Dahlia, the prejudice that many growers had against green plants is rapidly disappearing. During the past few years there has been quite a demand for them, especially plants of the newer and higher priced varieties.

That plants properly grown and carefully packed may be shipped a long distance, I have personally demonstrated. Experimenting along this line two years ago I shipped plants to two well known growers in California, a distance of over 3000 miles.

One package was sent by mail, and the other by express. The former took nine days, and the latter eleven days to reach its destination.

I have letters in my possession saying that the plants arrived in splendid condition, with only the lowest leaves turning yellow.

As a commercial proposition, I do not recommend these long-distance shipments, for the expense is too great. But for distances within a three or four days' journey (from the point of shipment to destination) they are quite practicable and may be done without any loss.

It must always be borne in mind that a package sent either through the mails or by express may be subjected to rough treatment and that containers must be strong and rigid enough to stand this treatment. Also the plants must be fastened in the box in some manner to prevent their being broken as the box is handled.

I am not prepared to say just what is the best method of packing. Some growers use specially made boxes with cardboard cleats or stops, a piece of cardboard with a slot for the stem of the plant being placed on top of the ball of roots. This, resting against the cleats, prevents the plant from shifting.

Others use the regular plant mailing tube, while some simply fasten the plant in by lacing it with cord passed through holes punched in the box.

As for the past two or three years I have found it necessary to ship some plants to the various trial grounds, and to growers who wanted to try some of my seedlings, I have evolved a very simple and efficient method of shipping them so that they invariably arrive in good condition. This method has now been adopted by some of the largest shippers of green plants.

We make small, square cartons 2½ inches wide and about 3 inches deep. They are easily made by cutting the cardboard (which should be stout and thin) into the proper size and folding two pieces over one another. Fold them over a wooden block of the size they are wanted and bind them with a piece of gummed paper.

In packing a plant a little damp moss is placed in the bottom of this carton; then the ball of the young plant is placed on top of this moss; a little dry moss is then placed on the top of the ball and the whole is tied with a piece of soft string or raffia.

For mail shipments shallow cardboard boxes only 2½ inches deep are used. These may be had in various sizes. A box 2½ inches wide will do for two plants, one at each end; one 5 inches wide will hold four plants; and one 8 inches wide will hold six plants. It is not advisable to have the boxes larger than this; better to use several boxes. For if the box be too wide it will tend to buckle in the middle. The boxes should be about 14 inches long.

Before the prepared plant is placed in the shipping box, a small, flat stake is cut the right length to fit inside the box. This stake is placed in the inside of the carton or little pot between the ball of soil and the cardboard, and when the plant is packed in the box, it will hold the plant perfectly rigid.

It is better not to wrap the plant in paper. The leaves can be folded carefully in the box and the wrapping of the plant will only tend to exclude the air and cause yellowing of the foliage.

Plants should be specially grown for shipment and should be stocky and well hardened off in a cool temperature before being shipped. Spindly or drawn plants grown in a high temperature do not stand shipment well, and the use of such plants has done much to cause the prevailing prejudice against the use of young plants.

Plants that are to be shipped should also be grown in a fairly heavy soil. The ball of soil will then not only retain the moisture longer, but it will more readily carry intact to its destination.

If the ordinary light soil usually used for the potting of all young plants be used, it will dry out quickly, and as soon as dry it will crumble into dust.

Moreover if a heavy soil be used in potting these young Dahlia plants, a more vigorous and shorter jointed plant will result.

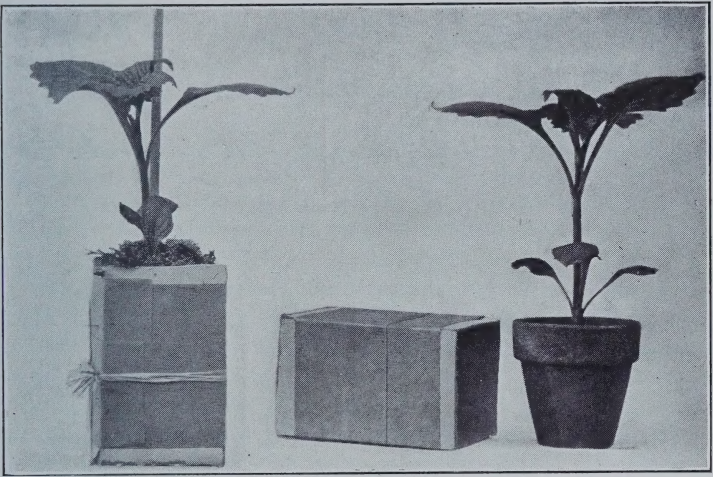
The plants should be very well rooted before being shipped, but they should not be entirely pot-bound, for in this condition they will dry out and suffer very quickly.

The above directions have been written principally to apply to small shipments made by mail, but larger shipments which go by express should be treated in much the same manner, except that wooden boxes should be used and the square cartons packed closely together in them. Being square they will be found to pack much more easily than if they were the regulation shape of a clay or paper pot. The plants should be placed upright in the boxes and if the small stakes be used, even though the box is turned upside down, the plants cannot move.

As with mail shipments it is better not to wrap the plants for express shipment; neither should a close fitting lid be used, as it is usually at a warm time of the year that they are shipped, and a free circulation of air is desired. Without it the plants may heat and rot.

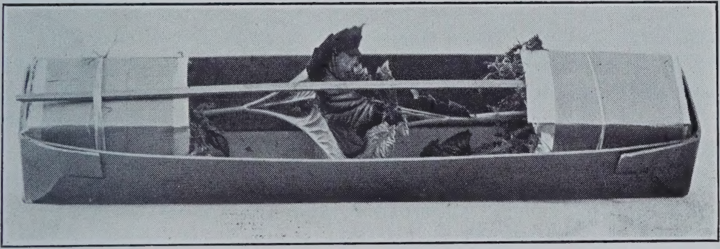
When the plants are received they should be immediately unpacked, sprayed overhead, and kept in a cool, shady place for an hour or so, when they will soon recover from their confinement. They may be left in the paper containers until it is time to plant them.

The planting of these plants is best done in the evening when they will have at least several hours of darkness during which to take up some moisture. They should also be shaded for a day or two until fully recovered—but this has already been treated on in the chapter on planting.



READY FOR PACKING—AND PARTIALLY PACKED

A sturdy young plant and a home-made square carton ***(right and center)*** **and** ***(left)*** **the plant removed from its pot and packed in moss in the carton. Note the light, protecting stake.**



TWO PLANTS ALMOST READY FOR SHIPMENT ANYWHERE

Each is firmly packed in a carton; the stakes (one to each plant) keep them from moving and the box from buckling. Cover the box, wrap and tie securely, and the package will go almost anywhere in safety.

THE DAHLIA AND ITS APPEAL

Botanical Features of the Dahlia

TO facilitate the proper study of plants, botanists have classified them into large, main groups or natural orders. Accordingly the Dahlia is classified as belonging to the natural order, Compositae; this is the most extensive order of herbs, shrubs and trees in the whole vegetable kingdom.

It derives its name from the structure of the normal flower as we know it; this is a "composition" of florets into one head. The flower of the Dahlia is, therefore, botanically not one flower but an inflorescence or group of flowers.

There are two different kinds of florets, best seen in what is known as the single type. The outer and broader petals forming a ray are known as *ligulate* florets, and the inner ones forming the disk, are called *tubular* florets.

If the flower be composed all of ligulate florets, we have what is known as the "double" form. This is botanically a misnomer, but the type is called double in practice to distinguish it from those with only one or two rows of ligulate florets, these being commonly called "singles."

Each individual floret in a Dahlia is really a perfect, individual flower, having its own sexual organs, etc. Other examples of compositae are the Aster, Chrysanthemum, Dandelion, Marigold, Sunflower, Cosmos, etc.

Horticulturally the Dahlia is a much-branched, herbaceous perennial, having a tuberous root.

There is but a small number of species, and all are natives of Mexico and central America. The genus, Dahlia, was named after Professor Andreas Dahl, a Swedish botanist.

In pronunciation the first "a" should be given the broad sound (as in *lark*) although it is often pronounced so as to give the a the long sound (as in *hail*). When so pronounced Dahlia becomes synonymous in sound with Dalea, an entirely different genus named after another botanist by the name of Dale.

Dahlia Varieties and Dahlia Classification

I modestly refrain from giving a list of varieties, for it would be a mere repetition of a catalog. I could give a list of what I consider the best 100 or so varieties, but it would be no criterion for I would be giving only the results of my own experience in a certain section, and this might be no guide for growers in Massachusetts or Georgia. Again, I might be slighting some of my very good friends by omitting some of their pet introductions. So I think it wisest to refrain from giving any such list at all.

By consulting any uptodate list or catalog—and their number is legion—one can select a collection in keeping with his or her means.

The choice of varieties is largely a matter of taste, and both climate and kind of soil alter the color, and even the habit and type, to some degree.

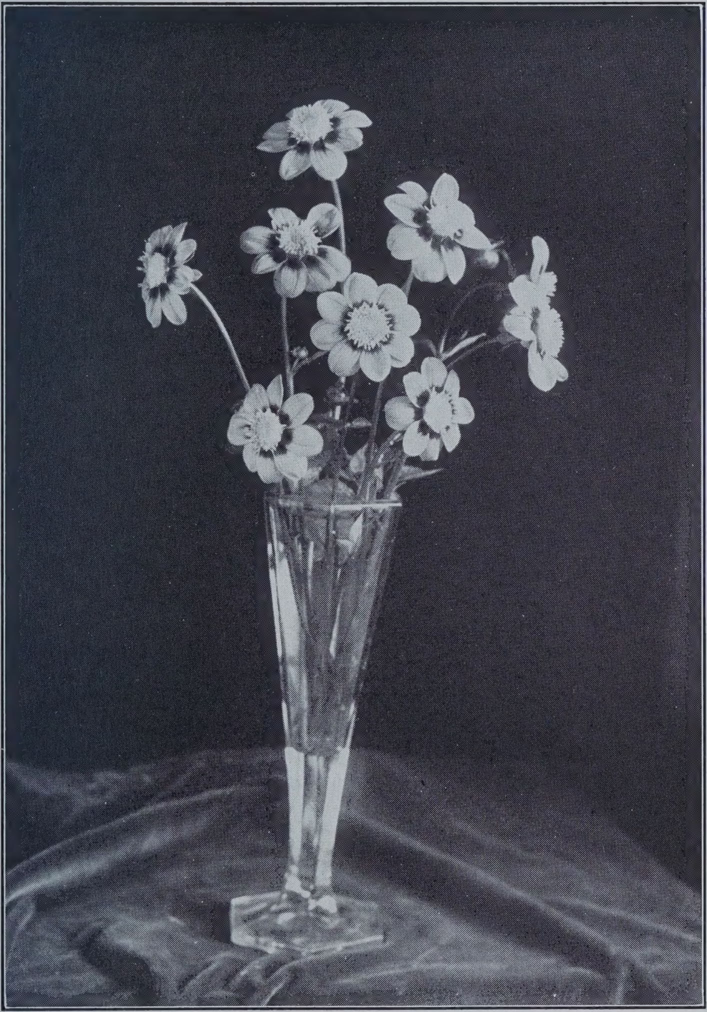
There are new varieties of great merit being introduced every year, some good ones from the West and some good ones from the East, although we have not had many very striking ones from Europe lately, due possibly to the embargo or to the changed conditions there.

The A. D. S. New Classification

The American Dahlia Society, realizing that the existing classification in force did not meet the requirements of all of the present day varieties, appointed a committee in 1930, of which the author was a member, to revise the classification so that it would be more practical and up to date. The following is the classification this committee suggested, and it was later adopted by the American Dahlia Society. After a season's trial, I might say that I found this classification to be simple and practical, and in my work, as a judge, and with many others with whom I consulted, we found it to be a great aid in the placing of awards. It is quite possible that as time goes on and other forms are produced, a revision will have to be made of this classification to make it still more practical. Where the forms vary so much and the various forms overlap and intermingle, as in the Dahlia, there will always be some varieties that will be difficult to classify properly. Most of the dealers are adopting this new classification, and it will only be a short time before it will become universal.

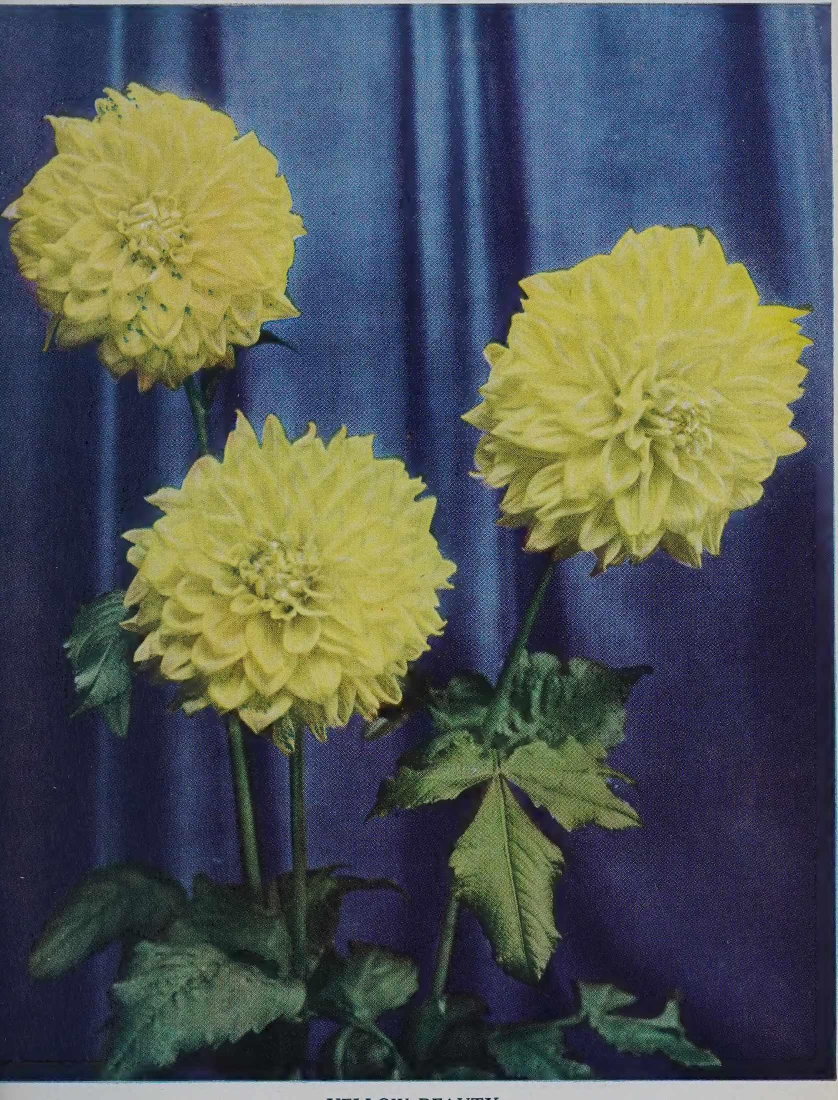
The classification is divided into fourteen classes and is as follows:

Class 1—Single: Open centered flowers with only one row of ray florets, regardless of form or number of florets. Examples, 20th Century, Newport Wonder, Fugi San and Coltness Gem.



FUGI SAN

A single Dahlia of splendid form, rich gold with dark band around the disc.



YELLOW BEAUTY

A formal decorative type which it is predicted, will be in the yellow class what Jersey's Beauty is in the pink.

Class 2—Anemone: Open centered flowers with only one row of ray florets, regardless of form or number of florets, with the tubular disc florets elongated, forming a pin cushion effect. Examples, Ada Finch, La Styx and Graziella.

Class 3—Collarette: Open centered flowers with only one row of ray florets, with the addition of one or more rows of petaloids usually of a different color, forming a collar around the disc. Examples, Mt. Lesser, Diadem, San Mateo Star.

Class 4—Duplex: Open centered flowers with only two rows of ray florets, regardless of form or number of florets. Examples, Golden Sunshine and Mrs. J. Coissard.

Class 5—Peony: Open centered flowers with not more than three rows of ray florets, regardless of form or number of florets, with the addition of smaller curled or twisted floral rays around the disc. Examples, Geisha, Gorgeous, City of Portland and Gertrude Dahl.

Class 6—Cactus Incurved: Fully double flowers with the margins of the majority of the floral rays revolute for one-half or more of their length. These floral rays tending to curve towards the center of the flower. Examples, F. W. Fellows, Bearclaws, Farncot and American Triumph.

Class 7—Cactus Recurved: Fully double flowers with the margins of the majority of the floral rays revolute for one-half of their length or more, these floral rays being recurved or straight. Examples, Ambassador, Eagle Rock Jewel and Eagle Rock Gem.

Class 8—Semi-Cactus: Fully double flowers with the margin of the majority of the floral rays revolute for less than one-half of their length. Examples, Edna Ferber, Arthur W. Gray, Alice Whittier and Francis Lobdell.

Class 9—Formal Decorative: Fully double flowers, floral rays generally broad, either pointed or rounded at tips with the outer floral rays, tending to recurve and the central floral rays tending to be cupped, all the floral rays in a somewhat concentric regular arrangement. Examples, Jersey's Beauty, Dr. John Carman, Trentonian, Mrs. I. de Ver Warner, Elite Glory and Monmouth Champion.

Class 10—Informal Decorative: Fully double flowers, floral rays generally long, twisted or pointed, and usually irregular in arrangement. Examples, Jane Cowl, Barbara Redfern, Insulinde, Mrs. Alfred B. Seal.

Class 11—Miniature Decorative: Fully double flowers, floral rays not revolute, conforming to the definitions of either the formal or informal types, and less than three inches in diameter. Examples, Little Jewel, Caronna, Daybreak. What is known as the charm Dahlias belong in this class.

Class 12—Ball: Fully double flowers, ball shaped or slightly flattened, floral rays in spiral arrangements, blunt or rounded at the tips, and quilled or with markedly involute margins, two inches or more in diameter. Examples, A. D. Livoni, Gold Medal, Velvet Ball and Maude Adams.

Class 13—Pompons: Having the same characteristics as the ball type, but less than two inches in diameter.

Class 14—Unclassified varieties such as new types or those existing that do not fit properly into the above classes.

Why Grow Dahlias?

Why is the Dahlia becoming so popular?

Well, it flowers at a time when color is scarce in the garden; it produces more flowers to the plant; and it has more variation in color and shape than any other outdoor flower in existence.

The culture of the Dahlia is one of the finest hobbies a person can have. To be done well Dahlias require a lot of attention (but by no means all laborious work); thus they keep the cultivator constantly interested, and out of doors at the best time of year.

I know many busy professional men—doctors, surgeons, dentists, bankers, etc.—who, after a busy day in the office, spend their spare time in the garden among their Dahlias, finding there real relaxation.

Apart from the pure pleasure that one may derive from the culture of the Dahlia, there is also profit to be derived if one cares to dispose of his or her surplus stock.

Many of the largest growers of the Dahlia today started in with a few choice varieties; then, wishing to make their hobby self-supporting, they disposed of their surplus in order to buy more new varieties.

Finally, seeing a demand for their flowers and roots, and liking the business better than the one they were originally devoted to, they have given up the former, to devote their whole time to the Dahlia business.

I do not know that any fortunes will ever be made out of growing Dahlias, but that good livings can be made, is shown and borne out by the number of Dahlia gardens that are springing up annually.

From Amateur to Professional

It is but a short transition from the amateur to the professional. The grower starts out all right as an amateur, but soon wishing, as I have already said, to make his hobby self-supporting, he sells his surplus stock in order to buy new varieties. If growers limit themselves religiously to this they are still bona fide amateurs according to the rules of the American Dahlia Society. They may even sell entire stocks of their seedlings to dealers without injuring their status. Indeed, many of our finest varieties have originated in the gardens of amateurs. But many enthusiasts, seeing the possibilities of selling more and more, begin to solicit business and issue lists.

There are many who hold that, as soon as a grower begins to solicit business and issue a list of varieties that he can supply (whether or not his livelihood depends on this business), he no longer belongs in the ranks of the amateur.

I am of the opinion that, especially at flower shows, there should always be two classes of amateurs: those who are strictly amateur, and those who might be called "semi-professional." This would give the bona fide amateurs, with their limited knowledge and few varieties, a chance at the prize winnings. It is not fair that one who grows Dahlias by the thousand should compete with those who have only a dozen or so.

How to Build Up a Dahlia Business

I do not know that I am qualified to give advice on how to build up a Dahlia business, but from my observations I have gleaned the following facts:

There are two sources of income from the Dahlia garden—the sale of cut flowers, and the sale of plants or roots.

If a grower is located near a good center where one can dispose of one's flowers locally at retail, more money will no doubt be made in that way from a small plot of ground than if one depends on the wholesale market.

I am convinced that one of the secrets of success where one is selling either roots or plants, is in supplying only the very best varieties absolutely true to name, and in letting one's customers know the good and bad points of each variety.

If a variety is not good enough for a grower to grow in his own collection it should not be sold to anyone else with less knowledge.

Those who wish to make a success of their business should maintain the very best exhibition gardens they can produce, and they should welcome visitors to their grounds. Poorly grown plants in an ill-kept garden will never stimulate sales.

Growers should also exhibit their varieties—grown as well as they can grow them—at all the flower shows they are able to attend, setting up their flowers in a nice, attractive manner; meeting old and new customers; and giving freely, when asked, all possible information regarding culture, etc.

Dahlias for Landscape Effect

Up to the past few years, for some reason or other, the Dahlia has been grown principally in back yards. Many an unsightly back yard has thus been converted into a place of beauty.

But gradually the Dahlia is finding its way into the front yards, and in many instances portions of the lawns have given way to Dahlia beds.

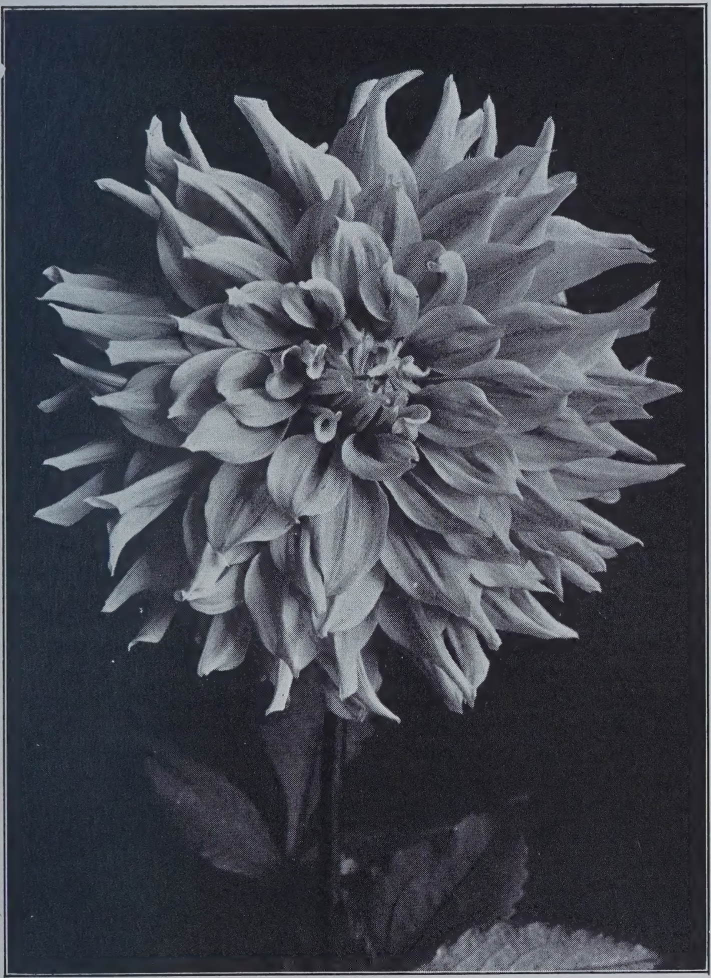
While most of the larger growers who grow for exhibition and for cut flowers grow the plants by themselves, in a portion of the garden or field set apart for them, yet Dahlias may be used with very good results for landscape effects, either in the mixed border or in beds set apart for them.

The late Judge Marean who did so much for the improvement of the modern Dahlia and who through John Scheepers, Inc., introduced so many good varieties to commerce, always grew his Dahlias (other than his seedlings) in beds and borders; here they did much to beautify his whole estate.

The New York Botanical Garden, under the able guidance of Dr. Marshall Howe, has also shown that Dahlias may be used with good effect for landscape decoration; and other parks and private estates are using them more and more every year to very good effect.

There are many combinations in which they may be used either in large shrubberies—with the shrubs as a background—or in the mixed perennial border, in association with other hardy Fall flowering plants. The dwarfer growing sorts should be selected for this purpose, and those that do not require too close pruning and disbudding.

Crotch bloomers and those that have a tendency to hide their flowers should not be used, but rather those that carry their flowers



KATHLEEN NORRIS

A bloom of gigantic proportions, of true rose pink, later deepening to mallow pink.

on stiff stems well above the foliage; also profuse bloomers only should be selected.

Plants grown in this manner, where the soil may not be so rich, will require lots of feeding if they are to keep up a supply of flowers, but with liberal applications of fertilizer and plenty of water when they need it, they can be kept in bloom until frost.

The Dahlia as a Florist's Flower

As a florist's flower the Dahlia in its season has a prominent place. In discussing its culture for this purpose, too much stress cannot be placed on the selection of varieties that produce real cut flowers with the desired keeping qualities; naturally, the better a flower holds up when cut, the more popular it will be. Color, form, stem and floriferousness are all important, but above all the blooms must last well in water.

Growing for Cut Flowers. The florist does not want a monstrosity for his general work, but rather a variety with flowers of medium size, well grown and with good stems. For this purpose the plants should be grown a little on the hard side, as too succulent and soft growth will, as a rule, produce poor keeping flowers. A disbudded flower will always have more substance than those that are not disbudded.

Cutting the Flowers. This should be done in the morning, or after the sun has lost its power in the late afternoon; the flowers should be placed in pails of water in the field, much of the foliage being removed so as to leave only those leaves nearest the flowers. This will prevent rapid wilting and will add to the life of the flowers.

Freshening Blooms Before Shipping. This can best be accomplished by putting the cut flowers in pails two-thirds full of cold water, and placing the pails in a cellar which should be cool, dark, and moist, with a slow circulation of air. If the walls of the cellar be kept sprayed with cold water, it will become a sort of refrigerator in which, in a few hours, even wilted flowers will stiffen up.

Packing the Flowers for Market. The flowers are usually packed in corrugated cardboard boxes. They should be packed snugly but not too tight; they may be placed in one or two layers, with the blooms at each end of the box, and the stems cleated down to prevent vibration and bruising in transit. The boxes should be lined with wax tissue paper, which is folded over the flowers before the lid is put on.

Flowers properly treated and packed carefully, have been safely sent on a journey taking from eighteen to twenty hours and have arrived in perfect condition. (See also directions for packing exhibition blooms, page 112.)

AIDS FOR THE DAHLIA LOVER

Dahlia Societies and Their Work

I DO not know of any other flower that has the number of societies devoted to it that the Dahlia has.

We have the American Dahlia Society, which was organized in 1915; there are now many state societies; and in many communities where there are two or three Dahlia enthusiasts there are local societies, some of them affiliated with the parent national organization.

The following extract from the constitution of the American Dahlia Society, will show the scope of its work:

> "The Society is formed for the purpose of stimulating interest in, and promoting the culture and development of, the Dahlia; to establish a standard nomenclature; to test out new varieties, and to give them such recognition as they deserve; to study the diseases of the Dahlia, and find remedies for same; and to disseminate information relating to this flower; to secure uniformity in awarding prizes at flower shows, and to give exhibitions when deemed advisable."

An extract from the constitution of the Dahlia Society of California may be taken as fairly representative of the aims of all the other state societies:

> "It aims to unite all parties acceptable to one another without regard to sex, occupation or profession, who feel an interest in Dahlia culture, especially for its own sake; to issue bulletins or other literature pertaining to the Dahlia and its culture; to arrange exhibits of the flower; and to assist others in so doing; to work together in a spirit of helpfulness and cooperation, to the end that public taste may be stimulated, that our homes may be made more attractive and beautiful, and that the glory of our State may be magnified."

That the Dahlia societies have done and are doing a great work cannot be denied, and it is the duty of every one who is a lover of the Dahlia and a seeker after more knowledge to join one; the annual dues are nominal, and the information contained in the quarterly bulletins is of great value.

A DAHLIA SHOW DISPLAY THAT CLEARLY DEPICTS THE VALUE OF THE DAHLIA AS A FLORIST'S FLOWER

The variety shown is Jersey's Beauty, and the occasion is the Show of the Monmouth County (N. J.) Horticultural Society. Dahlia displays such as this enable one to really judge the merit and beauty of a variety.

The American Dahlia Society and some of the state societies have established trial gardens, where all new varieties should be sent for trial before they are introduced.

They are open to any one, whether a member of the Society or not, and the plants are grown on carefully prepared ground under the eye of an expert.

They are judged by skilled judges and scored according to the rules laid down by the Society, and any variety scoring 85 points is awarded a certificate.

A trial ground is of inestimable value to the raiser and introducer of new varieties, and serves as a very cheap advertisement.

I am a firm believer in these trial grounds, and I hold that no new variety should be introduced without the Society's certificate. The sooner this rule is generally adhered to, the sooner patrons of the Dahlia will have something besides the mere say-so of the introducer to induce them to buy the new varieties.

It will also raise the standard of the new varieties to a high degree, for it is a lamentable fact that there are many new varieties being sold annually that are not one whit superior to varieties already existing.

The originator and introducer of new varieties should set a high standard for himself and only introduce those varieties that clearly show superiority. He should be ashamed to have his name appear in parenthesis as the introducer of certain varieties as novelties, and should set so high a standard that when a variety is listed with his name as originator, it will mean to the public something of real merit.

Apart from the bulletins issued by the various Dahlia societies, there are many publications pertaining to gardening that are very helpful to the amateur and the professional. Every one interested in the Dahlia or in gardening in any form should subscribe to some of these. The articles they contain are usually written by experts, and it is a very rare occurrence that one cannot find in their pages something of real and great benefit.

Dahlia Shows and What They Do

How to Go to a Dahlia Show

Flower shows of all kinds are educational institutions, but the modern Dahlia exhibition is probably the most educational of all. The Dahlia with its hundreds of varieties and many forms and colors can make a really attractive "one flower show."

The beginner should go to the Dahlia show principally for information, and should not hesitate to ask for it. I do not know of any one so willing to give of his or her knowledge as the real lover and grower of flowers.

One who is beginning to know and grow Dahlias should look for the flowers with the best stems. It is all right to admire those with short stems, but a beginner should never purchase a Dahlia unless he can see what sort of stem supports the flower.

Most of the growers are realizing that the stem is very important, so while they may show many on short stems (of which many more can be brought a long distance) yet they will usually show some of each variety on full length stems, especially in the case of new varieties.

Those who intend to be future exhibitors should pay particular attention to the awards made; they should try and judge the classes themselves.

Judging is usually done by comparison, and by the process of elimination the final award is made.

It is very seldom in a flower show that the score card is necessary except in the case of a tie. Then the scale of points may be referred to.

In the case of judging and scoring new seedlings, however, it is necessary to use the score card; the entries should be scored accordingly.

In the color classes (say that for six pink) the color must be taken into consideration, and all things being equal, the entry with the best color will get the premier award.

SOME DAHLIA EXHIBITION RULES

That the Dahlia has taken hold of the general public to a greater degree than any other flower, is evidenced by the great number of shows held every Fall, some of them regular Fall flower shows, but many of them devoted exclusively to the Dahlia.

For a proper governing of these shows, there are certain rules formulated, and some of the most important are the following:

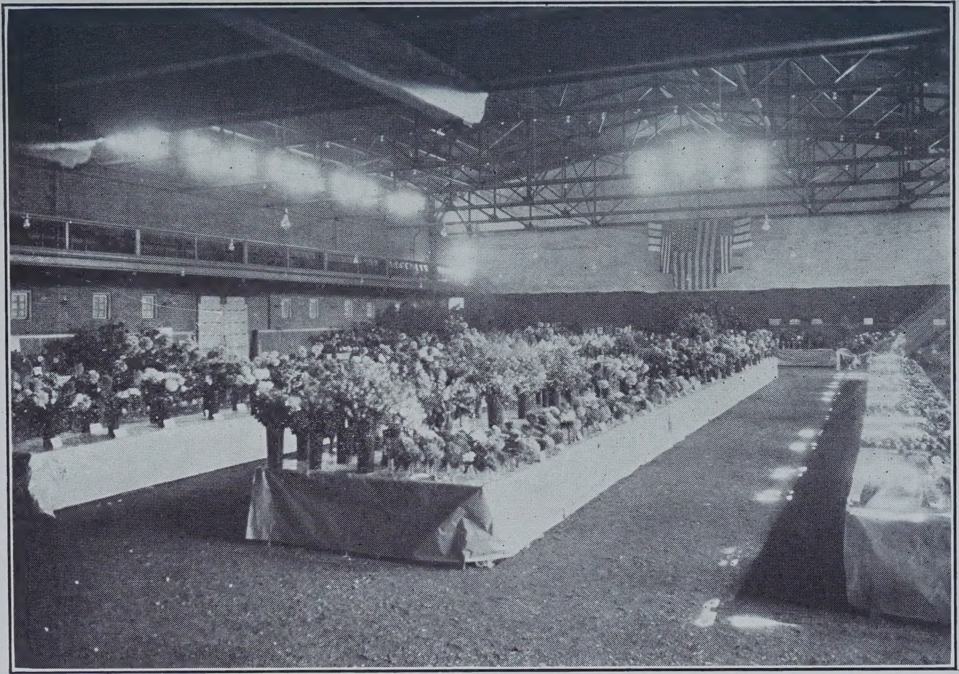
Rule 1.—No bloom shall be exhibited unless grown by the person making the exhibit, except in the classes for decorative work; the fact of entry constitutes an absolute declaration that the flowers are so grown.

Rule 2.—Each variety shown must be correctly and plainly labeled with its proper name, and each seedling should be also marked with a number or letter.

Errors in nomenclature should not disqualify an exhibit if there was no intent to deceive, and if the exhibitor is willing to correct same.

Rule 3.—If a certain number of blooms for a class is specified, the exact number must be shown.

Rule 4.—No award to be made unless the exhibit is meritorious.



A SUCCESSFUL LOCAL DAHLIA SHOW

The Dahlia, perhaps more than any other subject, provides material for a really successful, attractive and interesting "one flower" show. This exhibition was staged at Red Bank, N. J., in 1924.

Rule 5.—Only one prize will be awarded to the same person in any one class.

Rule 6.—It is understood that exhibitors agree to be governed by these rules and regulations in making entries.

Rule 7.—Protest must be made within two hours after all awards are made, and must be in writing, stating the grounds for protest. All such protests shall be promptly ruled upon by the committee, whose decisions shall be final.

The classes for competition are usually divided into four sections, namely, Amateur, Professional or Private Gardener, Commercial, and Open.

AMATEUR AND OTHER CLASSES

The American Dahlia Society has adopted the following definition to cover the status of an amateur:

> By the word "Amateur" is understood a person who maintains a garden with a view to his or her own use and enjoyment, and not for the purpose of making a profit or gaining a livelihood.
>
> The fact that such persons dispose of surplus stock—or their entire stock of a seedling—for money, does not change their status, *unless* the maintenance of the garden is intended to return them an annual profit.
>
> No person can compete in the amateur class who permanently employs a trained gardener, florist or nurseryman, or who is employed as such.

The Dahlia Society of New Jersey has further adopted the ruling that anyone who publishes a list, with the intent to sell or solicit business, is no longer an amateur.

The Amateur Class is thus fairly well defined. Yet there are many who want to exhibit in the amateur classes at shows, but who, when they come to purchase stock, pretend that they are commercial and demand discounts usually allowed to the trade.

This is not right, and if one wants to retain the status of an amateur, he or she should not ask for, nor expect to get, the same prices as those who buy for sale again at a profit.

The *Professional or Private Gardener's* section is that in which all who permanently employ a gardener or gardeners are allowed to compete. I do not know whether the question has ever been brought up as to whether they should be allowed to sell or not, but as long as an amateur is allowed to sell his or her surplus without a change of status, it is inferred that those who employ a gardener can do likewise.

The *Commercial* section is for those who grow and sell Dahlias as all or a part of their livelihood or regular business.

The *Open* section is open to all, both those who belong in one of the regular, well-defined sections, and those, if any, who do not come under any of the above classifications.

How to Exhibit Dahlias

Preparing Flowers for Exhibitions

It is well for the exhibitor to look over his plants very carefully, a week or so before the show, and get some idea as to how the flowers are going to shape up.

All flowers destined and selected for the shows should be carefully and securely tied to their stakes, for often, at the last moment, a storm may come that would damage unsupported flowers in short notice.

Any flowers that might, under ordinary conditions, be just too early for the show, may be shaded, especially if the stock is limited. This will prevent the blooms from developing too fast and will save many flowers; it will also improve the depth and richness of color of the reds and pinks.

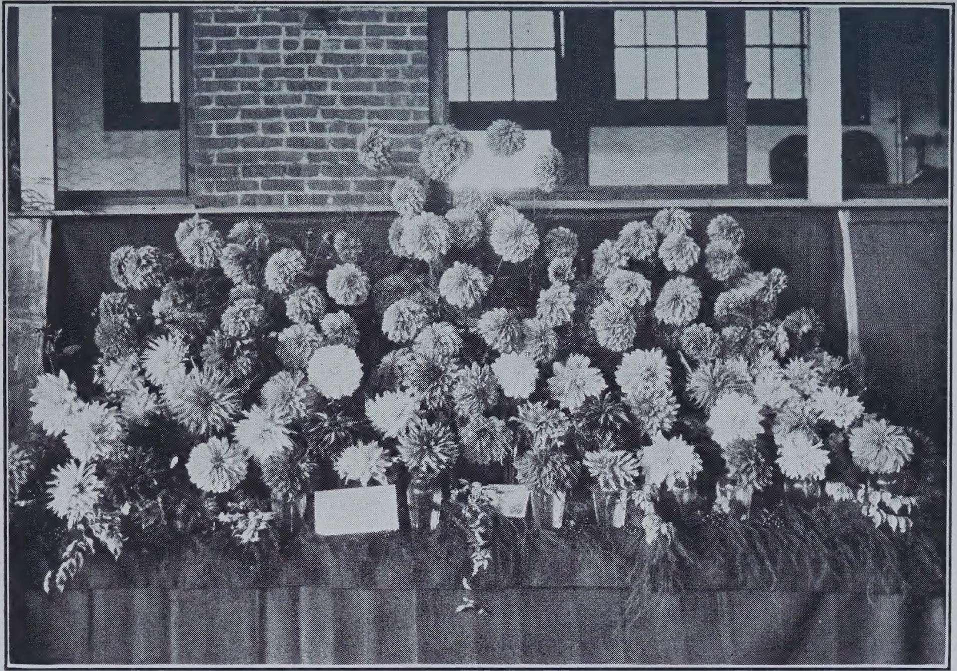
The individual flowers only should be shaded, not the whole plant; there are many devices that may be used, but I have found wire rings about 18 inches in diameter covered with muslin very effective. These are fastened to stakes and adjusted at the desired heights.

The flowers should be cut the morning or evening preceding the day of the show. If a hot, dry spell of weather is on at the time and the flowers are rather wilted looking, they should be sprinkled with water, the stems placed in a deep vase filled with cold water, and the vase placed in a cool, dark place overnight. This will cause the flowers to stiffen up.

Packing the Flowers

If the show is to be held at some distance so the flowers have to be packed in boxes, the blooms should be perfectly dry when packed; for the weather is usually warm at this time, and damp petals very soon rot and decay.

Shallow boxes, a little deeper than the diameter of the largest flowers, are used. These are lined with paper, and the flowers are placed neatly in, in single layers; in the case of large flowers a cushion of soft material, such as tissue paper, should be so placed that the stem of the flower at the neck will rest on it and prevent undue pressure of the petals on the bottom of the box.



A WELL STAGED GROUP OF MODERN DAHLIAS TO SHOW FLOWER TYPES

Where type, size and color of flower are the principal points of interest, the display of short-stemmed blooms is permissible. But an arrangement of flowers on long stems and with their own foliage, is more artistic and makes possible a better appraisal of the cultural value of the variety and its keeping qualities.

A row of flowers is placed at each end; then another row, with tissue paper between to keep the flowers of the second row away from the stems of the first, and so on until the box is filled. The longest stemmed varieties should be put in first, finishing up with the shorter stems.

The exhibitor should always take more flowers than necessary to fill the classes, for there will always be some that are *passé* when the box is opened up.

Exhibitors should read the rules very carefully, and no more nor less blooms than are called for should be put in a collection.

I have often seen some very fine exhibits disqualified for infractions of the rules.

It is always wise to have the flowers of an even size; one very large bloom in a collection of ordinary flowers only emphasizes what the others ought to have been.

Flowers should be fresh, even, and well finished. Varieties should always be properly classified; a Decorative should never be shown with an open or Peonylike center, as it will surely be penalized.

In the classes for a certain specified number of blooms, flowers should never be shown with well developed buds on them, for buds are flowers, and will be classed and counted as such.

When an exhibitor is putting up a number of classes, it is a good time to mind one's own business, and put one's whole time and attention on the job in hand. After they are all arranged and put in their respective places, with class cards, etc., in place, *then* the exhibitor may relax and enjoy himself.

Points on Judging Dahlia Exhibits

The American Dahlia Society has adopted the following scale of points for the judging of flowers on long stems in vases, and for growing plants:

Size	20 points	Form	20 points
Substance	15 points	Color	20 points
Stem and foliage			25 points

The judges should be men or women who are perfectly familiar with Dahlias, they should be broadminded and they should not be governed by their own, personal likes and dislikes. One who has had experience as an exhibitor usually makes a good judge.

For judging baskets and vases arranged for effect, ladies are usually better than men, for here an eye well trained to see color and harmony is wanted rather than one qualified especially to judge the perfection of a flower.

Judging of New Seedlings at the Trial Gardens

For the proper judging of the new seedlings at the Trial Gardens, it had long been felt that a proper score card should be adopted, and Mr. Wm. B. Sweeney, who has assisted ably at the Trial Gardens as a judge, evolved the following score card, which has been found in actual practice to be of great assistance to the judges:

TRIAL GROUNDS AMERICAN DAHLIA SOCIETY

Entry No................ Date..............19

SCORE PLAN

Field judging — Exhibition types

Date..........................
Variety.......................
Type..........................
Stake.........................

Color	*15 total*		*basic 12 points*
New shade		add 2	
Artistic		add 1	
Burn			deduct 2
Washy			deduct 2
Variegation			deduct 1
Stem	*25 total*		*basic 15 points*
Stem is judged base of ovary to first leaf bracts			
Basic allows 8 inch stem			
Each extra 5 inches		add 2	
Straight		add 2	
Facing or top bloom		add 2	
Crook neck			deduct 2
Branching, crochety			deduct 2
Undersize stem			deduct 5
Foliage	*20 total*		*basic 14 points*
Clean		add 2	
Artistic		add 2	
Resistant		add 2	
Diseased			deduct 4
Sparseness			deduct 2
Coarseness			deduct 2
Form	*20 total*		*basic 12 points*
Form based on present A.D.S. rules standard varieties.			
Petal regularity		add 2	
Artistic		add 2	
Petal substance		add 2	
New formation		add 2	
Variable petalage			deduct 2
Blowing			deduct 2

Size.................20 total.................basic 12 points
Average for type allow in basic figure
Cactus 5 inch
Dec. or H. C. 5 inch
Single 2 inch
For each 2 inches in diameter over
average allow....................add 2
For each 1 inch in depth............add 1
Deductions same basis for under size.

Total 100 points. Basic figure 65 points. Certificate 85 points.

Following is a working example:

Dahlia.. .Mrs. I. de Ver Warner
Type....Decorative

Color	Basic	allow 12 points	
	Artistic	allow 1 point	13
Stem	Basic	allow 15 points	
	18 inch stem	allow 4 points	
	Straight	allow 2 points	
	Facing bloom	allow 1 point	22
Foliage	Basic	allow 14 points	
	Clean	allow 2 points	
	Artistic	allow 1 point	
	Resistant	allow 2 points	19
Form	Basic	allow 12 points	
	Regularity	allow 2 points	
	Artistic	allow 1 point	
	Substance	allow 1 point	
	Formation	allow 1 point	17
Size	Basic	allow 12 points	
	Add diameter	allow 4 points	
	Add depth	allow 2 points	18
	Total score		89 points

SUMMARY

Do not plant Dahlias in dense shade.

Do not plant them too close to trees or buildings.

Do not plant them too early.

Do not allow the soil to bake around the plants; cultivate them.

Do not allow more than one shoot to grow from a root.

Do not allow more than one flower to open on each flower stem.

Do not allow the plants at any time to suffer for want of water.

Do not allow the plants to get eaten up with insects.

Do not allow the plant to muddle along itself; give it some assistance.

Do not pull the clump up at digging time.

Do not use a spade for digging; use a fork.

Do not divide the clump until the eyes begin to show, unless you have some experience.

Do not cut off the roots without a portion of the old stem.

Do not allow the flowers to wither on the plant unless seed is desired; if you cannot use them all yourself, give them to your friends.

Do not plant inferior varieties and expect to get fine large flowers.

Do not save any stunted or diseased plant; burn it up.

Do not allow the roots to dry out and shrivel in storage.

Do not allow roots to rot in storage; look them over once in a while.

Do not save any seedlings that are not better than existing varieties of the same types.

Do not show inferior flowers and expect to win a first prize.

Do not kick at the judging; judges are only human.

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Variety	Originator	Type	Color	Remarks

Variety	Originator	Type	Color	Remarks

Variety	Originator	Type	Color	Remarks

Variety	Originator	Type	Color	Remarks

Variety	Originator	Type	Color	Remarks

Variety	Originator	Type	Color	Remarks

Variety	Originator	Type	Color	Remarks

Bo
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